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AUTHOR	Riccobono, John A.; Cunningham, J. W.
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ABSTRACT

This study represents one phase of a broader research project designed to develop and test the Occupation Analysis Inventory (OAI). The study is basically a replication of an earlier study which derived a set of work dimensions for classifying jobs for educational purposes. Using a new sample of 400 jobs, the present study is designed to determine the stability of the originally derived factor structure and to derive first- and higher-order factors from the OAI ratings of a combined sample of 814 jobs. Evidence of factorial stability was obtained through factor comparisons across the two samples. Although the results were comparable to those obtained in the earlier study, they were not as favorable as expected. Factors derived from the combined sample were found to be more stable than those obtained from the two smaller samples. Factor analyses of seven groups of OAI work elements yielded 90 first-order factors, 88 of which were interpreted. Factor analysis of the first-order factors produced 22 interpretable higher-order factors. It was noted that the factors obtained are subject to a different interpretation than those obtained in the earlier study, in which OAI items were intercorrelated on the basis of estimated attribute--requirement profiles. A related study is VT 015 081. (Author/BH)

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WORK DIMENSIONS DERIVED THROUGH SYSTEMATIC JOB ANALYSIS

A Replicated Study of the Occupation Analysis Inventory

John A. Riccobono and J. W. Cunningham

Department of Psychology
North Carolina State University at Raleigh

Report No. 6 of the Ergometric Research and Development Series

Program Director: J. W. Cunningham

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PREFACE

This is the sixth report in the Ergometric Research and Development Series of the Center for Occupational Education, and the second report on the delineation of work dimensions producted by Mr. Riccobono and Dr. Cunningham. The first of these two reports, entitled Work Dimensions Derived Through Systematic Job Analysis: A Study of the Occupation Analysis Inventory, which was published as the fifth report in the Ergometric Research and Development Series and as Center Research Monograph No. 8. The present report is essentially a replication of the earlier work, but based on a different sample of jobs.

The Center extends its appreciation to Mr. Riccobono and Dr. Cunningham for conducting the research for this report and to the Center's editorial and technical staff, especially to Mrs. Joyce Pollard and Mr. J. K. Dane, for its production. Mr. William Ballenger and Mrs. Faye Childers deserve special thanks for handling the processing of the data.

The entire Ergometric Research and Development Series has been made possible through the excellent cooperation of the Occupational Analysis Fields Center, Employment Security Commission, Raleigh, North Carolina, and the Center expresses its gratitude to this organization.

John K. Coster
Director

SUMMARY

This report, the sixth in the Ergometric Research and Development Series, describes a follow-up of a previous investigation in which factors (or work dimensions) were derived from ratings of a representative sample of 400 jobs on the Occupation Analysis Inventory (OAI).

The first objective of the present study was to determine the stability of the originally derived factor structure through a replication of the original factor analyses with a new sample of 400 jobs. The second and third objectives involved the derivation of first- and higher-order factors, respectively, from the OAI ratings of a combined sample of 814 jobs.

Evidence of factorial stability was obtained through factor comparisons across the two samples using Tucker's coefficient of congruence. The results of these analyses, though comparable to those obtained in a previous study employing a similar instrument and similar procedures, were not as favorable as expected. It was noted, however, that the factors derived from the combined sample of 814 jobs are likely to be more stable than those obtained from the two smaller samples. Subsequent analyses will be performed to determine the interrater reliabilities of scores on the factors obtained from the combined sample.

Factor analyses employing the OAI ratings of 814 occupations were performed on seven _a priori_ groups of OAI work elements (items). These analyses yielded 90 first-order factors, 88 of which were interpreted. Next, the first-order factors were subjected to a factor analysis which produced 22 interpretable higher-order factors.

It was noted that the factors obtained in this study are subject to a different interpretation than the factors obtained in an earlier study in which OAI items were intercorrelated on the basis of estimated attribute-requirement profiles. The implications of this difference were discussed.

TABLE OF CONTENTS

Page

PREFACE ii

SUMMARY iii

LIST OF TABLES. v

INTRODUCTION. 1

PROCEDURE 3

Comparisons of Factors Derived from Two Job Samples 3
Factor Analyses of the OAI Sections with the Combined Sample. . . 6
Higher-Order Factor Analysis. 6

RESULTS 7

Comparisons of Factors Derived from Two Job Samples 7
Factor Analyses of the OAI Sections with the Combined Sample. . . 7

Dimensions of Information Received. 9
Dimensions of Mental Activities 19
Dimensions of Physical Work Behavior. 24
Dimensions of Representational Work Behavior. 35
Dimensions of Interpersonal Work Behavior 39
Dimensions of Work Goals. 42
Dimensions of Work Context. 52

"Higher-Order" Factor Analysis. 58

DISCUSSION. 70

LIST OF REFERENCES. 78

APPENDICES. 80

Appendix A. List of Jobs Contained in the Replication Sample . . 81
Appendix B. OAI Items Excluded from the Factor Analyses. 95
Appendix C. Factors Obtained from Replication Sample 97
Appendix D. Factor Correlation Matrices for the Seven Sectional Analyses with the Replication Sample 132
Appendix E. Matrices Containing Coefficients of Congruence . . . 139
Appendix F. Factor Correlation Matrices for the Seven Sectional Analyses with the Combined Sample. 146
Appendix G. Factor Correlation Matrix for the Higher-Order Analysis 153

LIST OF TABLES

Page

1. Numbers and Percentages of Jobs Drawn from Major Occupational Groups of the U. S. Bureau of Labor Statistics 5
2. Frequency Distribution of the Coefficients of Congruence for 81 Factors Obtained from the Seven Sectional Factor Analyses. 8
3. Dimensions of Information Received. 10
4. Dimensions of Mental Activities 20
5. Dimensions of Physical Work Behavior. 25
6. Dimensions of Representational Work Behavior. 36
7. Dimensions of Interpersonal Work Behavior 40
8. Dimensions of Work Goals. 43
9. Dimensions of Work Context. 53
10. Higher-Order Work Dimensions. 59
11. Summary of the 90 First-Order Factors Obtained from the Seven Sectional Factor Analyses 72
12. Summary of 22 Higher-Order Work Dimensions. 76
13. Dimensions of Information Received: Replication Sample . . . 98
14. Dimensions of Mental Activities: Replication Sample. 105
15. Dimensions of Physical Work Behavior: Replication Sample . . 108
16. Dimensions of Representational Work Behavior: Replication Sample. 117
17. Dimensions of Interpersonal Work Behavior: Replication Sample. 120
18. Dimensions of Work Goals: Replication Sample 122
19. Dimensions of Work Context: Replication Sample 128
20. Factor Correlation Matrix for the Information Received Section of the OAI: Replication Sample 133

LIST OF TABLES (continued)

Page

21. Factor Correlation Matrix for the Mental Activities Section of the OAI: Replication Sample 134

22. Factor Correlation Matrix for the Physical Work Behavior Section of the OAI: Replication Sample 135

23. Factor Correlation Matrix for the Representational Work Behavior Section of the OAI: Replication Sample. 136

24. Factor Correlation Matrix for the Interpersonal Work Behavior Section of the OAI: Replication Sample. 136

25. Factor Correlation Matrix for the Work Goals Section of the OAI: Replication Sample. 137

26. Factor Correlation Matrix for the Work Context Section of the OAI: Replication Sample. 138

27. Coefficients of Congruence for Information Received 140

28. Coefficients of Congruence for Mental Activities. 141

29. Coefficients of Congruence for Physical Work Behavior 142

30. Coefficients of Congruence for Representational Work Behavior. 143

31. Coefficients of Congruence for Interpersonal Work Behavior. . 143

32. Coefficients of Congruence for Work Goals 144

33. Coefficients of Congruence for Work Context 145

34. Factor Correlation Matrix for the Information Received Section of the OAI: Combined Sample. 147

35. Factor Correlation Matrix for the Mental Activities Section of the OAI: Combined Sample. 148

36. Factor Correlation Matrix for the Physical Work Behavior Section of the OAI: Combined Sample. 149

37. Factor Correlation Matrix for the Representational Work Behavior Section of the OAI: Combined Sample 150

38. Factor Correlation Matrix for the Interpersonal Work Behavior Section of the OAI: Combined Sample 150

LIST OF TABLES (continued)

Page

39. Factor Correlation Matrix for the Work Goals Section of the OAI: Combined Sample 151

40. Factor Correlation Matrix for the Work Context Section of the OAI: Combined Sample 152

41. Factor Correlation Matrix for the Higher Order Analysis . . . 154

INTRODUCTION

This report is the sixth in a series dealing with the development of a quantitative system for describing and structuring the world of work for educational purposes. An early report in the Ergometric Research and Development Series dealt with the construction of the Occupation Analysis Inventory (OAI), a job-rating instrument containing 622 "work elements," or descriptors of work activities and conditions (Cunningham, Tuttle, Floyd, and Bates, 1971). The OAI was designed to achieve as high a level of descriptive specificity as possible, while retaining applicability to the general population of jobs and occupations. The fourth report describes an effort to link the OAI work elements, which describe work in terms of observable events (activities and conditions), to descriptions of measurable human attributes in the cognitive, affective, and psychomotor domains (Neeb, Cunningham, and Pass, 1971). In this latter study, estimated attribute-requirement profiles were derived for the OAI work elements, and these profiles were, in turn, used as a data base in deriving a set of basic work dimensions (factors) underlying the OAI elements. The fifth report in the Ergometric Series involves the derivation of a comprehensive (though tentative) set of work dimensions based on OAI ratings of a sample of 400 jobs (Riccobono and Cunningham, 1971). These dimensions represent classes of work activities and conditions (work elements) that tend to coexist in jobs, as contrasted with the dimensions obtained in the previously cited study by Neeb *et al.*, which represent classes of work elements with similar human attribute requirements.

The present report is a follow-up of the previous study by Riccobono and Cunningham. The follow-up study was necessary because of the danger in accepting a factorial structure without first testing its replicability. As Armstrong and Soelberg (1968) have demonstrated, it is possible to obtain interpretable factors from randomly generated data. Thus, the present study was designed, in part, to test the stability of the factors obtained in the earlier study.

The purpose of this study was threefold:

(1) The first objective was to determine the stability of the previously identified factor structure (Riccobono and Cunningham, 1971) through replication of the earlier factor analyses with a new sample of 400 jobs.

(2) The second objective was to repeat the above factor analyses using a combined job sample containing both the original and replication samples, thereby increasing the variation of ratings on the OAI items and hence the likelihood of obtaining meaningful and stable factors.

(3) The third objective was to perform a "higher-order" factor analysis of the factors obtained from the combined sample, in

order to (a) reduce the redundancy in the first-order factors, (b) reduce the first-order factors to a more manageable number of dimensions, and (c) derive a basic set of work dimensions (the higher-order factors) which might be interpreted in accordance with the information-processing paradigm underlying the organization of the OAI (Cunningham *et al.*, 1971)--i.e., dimensions defined in terms of Information Received, Mental Activities, Work Behavior, Work Goals, and Work Context.

PROCEDURE

The procedure is discussed below in three sections corresponding to the three objectives of the study.

Comparisons of Factors Derived from Two Job Samples

The first phase of this study involved a replication of the factor analyses conducted in a previous study (Riccobono and Cunningham, 1971) and a comparison of the factor structures derived in the two studies. Although the sample in the previous study (N=400) was drawn in proportion to the numbers of jobs within major occupational categories of the Dictionary of Occupational Titles (1965), there is a second sampling strategy that might be employed in selecting a representative sample of jobs (Cunningham and McCormick, 1964). This strategy would entail drawing jobs in proportion to the numbers of people employed within the major occupational groups defined by the U. S. Bureau of Labor Statistics (U. S. Department of Labor, 1971). For the replicated study, 400 jobs were drawn using this second sampling strategy.

Prior to this study, 290 written job descriptions had been drawn from the files of the U. S. Employment Service (USES) corresponding to occupational titles for which General Aptitude Test Battery data were available (U. S. Department of Labor, 1967).[1] Written descriptions were also available for approximately 50 additional jobs for which various test data were to be collected. These jobs for which written descriptions were already available (for use in other studies) comprised the initial base for the construction of the job sample used in the present study. This sample was constructed in conformance with the percent distribution of the employed population in the major occupational categories of the U. S. Bureau of Labor Statistics.

The steps in sample construction were as follows:

(1) First, the titles of the available job descriptions were sorted into the major occupational categories of the Bureau of Labor Statistics.

(2) The number of titles falling into each category was then divided by 400 (the total sample size), and the resulting

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[1] All of the job descriptions used in this study were obtained from the files of the Occupation Analysis Field Center, Employment Security Commission, Raleigh, North Carolina.

proportion was compared with the existing proportion of the employed population falling into that category.

(3) Next, a determination was made of the number of sample cases to be added or subtracted from each category in order to bring the sample into conformance with the population figures.

(4) Finally, the appropriate numbers of job titles were randomly removed from those categories containing excess sample cases and randomly added to those categories with insufficient numbers of sample cases. In instances where cases were added, occupational titles were drawn randomly from the appropriate categories of the detailed list of occupations presented by the Bureau of the Census (U. S. Department of Commerce, 1963, Table 201). The appropriate code numbers for the titles to be added were then identified in the Dictionary of Occupational Titles, and job descriptions with the appropriate or closest matching DOT numbers were located in the USES files.

Table 1 presents the distribution of the resulting job sample in relation to the distribution of employed people in major occupational groups. The complete list of jobs comprising the sample is shown in Appendix A.

As in the previous study, the written job descriptions were rated on the Occupation Analysis Inventory (OAI). The job raters included eight professional job analysts (also employed in the previous study) and five graduate students in psychology. There were 50 jobs in the sample that received three separate OAI ratings each (by three different raters). The mean OAI ratings for these jobs were employed in the factor analyses. Each of the remaining 350 jobs was rated once on the OAI. After the ratings were collected, the answer sheets were checked and coded, and the data were punched onto IBM cards for subsequent analysis. All computations were done on an IBM 370/165 computer.

Since the factors obtained in the present study were to be compared with those derived previously, the procedures used in the original study (Riccobono and Cunningham, 1971) were also employed in the present study. Thus, those items which were omitted from the previous analyses because of insufficient variation and/or inadequate reliability were also excluded from the present analyses. Similarly, open-ended items and items pertaining to sensory channel and incentives were not included in these analyses. In all, 215 of the 622 OAI items were eliminated, leaving a total of 407 items which were involved in the factor analyses. A complete list of the excluded OAI items is presented in Appendix B. Separate principal component analyses were performed on seven sets of items corresponding to the following sections of the OAI: (1) Information Received (90 items); (2) Mental Activities (38 items); (3) Physical Work Behavior (135 items); (4) Representational Work Behavior (32 items); (5) Interpersonal Work Behavior (25 items); (6) Work Goals (78 items); and (7) Work Context (47 items). Factors were rotated obliquely to

Table 1. Numbers and Percentages of Jobs Drawn from Major Occupational Groups of the U. S. Bureau of Labor Statistics

Occupational Group	Number of Jobs in the Sample	Percentage of Job Sample	Percentage of Employed People in 1970[a]
White-collar workers:			
Professional, technical, and kindred	57	14.25	14.2
Managers, officials, and proprietors, excluding farm	42	10.50	10.5
Clerical and kindred	70	17.50	17.4
Sales workers	25	6.25	6.2
TOTAL	194	48.50	48.3
Blue-collar workers:			
Craftsmen, foremen, and kindred	50	12.50	12.9
Operatives	71	17.75	17.7
Laborers, excluding farm and mine	19	4.75	4.7
TOTAL	140	35.00	35.3
Service workers:			
Private household workers	2	0.50	2.0
Other service workers	48	12.00	10.4
TOTAL	50	12.50	12.4
Farm workers:			
Farmers and farm managers	8	2.00	2.2
Farm laborers and foremen	8	2.00	1.7
TOTAL	16	4.00	3.9
GRAND TOTAL	400	100.00	99.9

[a] Based on data published by the U. S. Bureau of Labor Statistics (1971).

simple structure in each of these analyses (Gennrich and Sampson, 1966); the number of factors rotated in each section was the same as the number rotated for the corresponding section in the previous study. Tucker's (1951) coefficient of congruence was used to compare the rotated factors emerging from each of these analyses to those identified in the corresponding analyses by Riccobono and Cunningham (1971).

Factor Analyses of the OAI Sections with the Combined Sample

In the second phase of this study, the two separate job samples (i.e., the replication sample and the original sample), plus an additional 14 jobs for which OAI ratings had been collected, were combined into one sample in order to obtain increased variation on the OAI items. The seven sectional factor analyses were repeated using the combined sample (N=814 jobs). The "scree test" (Cattell, 1966) was employed to determine the number of factors to retain for rotation in each section. Factors were again rotated obliquely to simple structure.

Higher-Order Factor Analysis

Finally, a "higher-order" factor analysis was performed on the first-order factors emerging from the sectional analyses of the data from the combined sample. The procedure involved in this analysis was essentially the same as that in each of the previous factor analyses, the one exception being that the variables in this case were OAI factors, whereas in the previous analyses the variables were OAI items. The observations corresponded to the 814 jobs in the combined sample. The extraction and rotation techniques were the same as those previously described.

RESULTS

The results of each phase of the study are discussed separately in the sections which follow.

Comparisons of Factors Derived from Two Job Samples

The tables of rotated factor loadings for the seven sectional analyses involving the replication sample are shown in Appendix C. The factor correlations are shown in Appendix D.

As noted previously, the coefficient of congruence (Tucker, 1951) was used to compare the factors derived from the replication sample with those obtained in the previous study (Riccobono and Cunningham, 1971). Each rotated factor emerging from a sectional analysis of the data from the replication sample was compared with every factor obtained from the corresponding sectional analysis of the original job sample. For example, 289 coefficients of congruence were computed for the first section (Information Received), in which 17 factors were rotated. The Tucker coefficient was developed to determine the extent of similarity between pairs of factors across two studies employing identical variables but different samples. For any two factors being compared, the coefficient of congruence is a measure of the relationship between the loadings of their common variables. This index can range in value from +1 to -1 and has an interpretation similar to that of the correlation coefficient.

The coefficients of congruence for the seven sectional factor analyses are presented (in matrix form) in Appendix E. Table 2 contains frequency distributions of the highest congruence coefficients for the factors in the replicated sample when compared with the factors in the original sample. These distributions were compiled from the highest values in the columns of the matrices in Appendix E.

Factor Analyses of the OAI Sections with the Combined Sample

Following the congruence analyses, the two job samples were combined, and the seven sectional factor analyses were repeated using the combined sample (N=814). A total of 90 factors were extracted and rotated, 88 of which were interpreted. These factors are presented in Tables 3 through 9. The intercorrelations between the factors obtained in each section are shown in Appendix F. According to Guilford (1954), factor loadings greater than .25 to .30 are "substantial"; thus, only those work elements having loadings of .29 or higher were included in the tables. The resulting dimensions are described in the following

Table 2. Frequency Distribution of the Coefficients of Congruence for 81 Factors Obtained from the Seven Sectional Factor Analyses

	OAI Section[*]								
Congruence Coefficient	1	2	3	4	5	6	7	TOTALS	Cumulative Proportion
.90 - .99	5	1	0	3	1	3	2	15	1.000
.80 - .89	5	3	2	1	2	2	1	16	.815
.70 - .79	3	1	2	0	2	3	2	13	.617
.60 - .69	1	0	4	1	1	4	3	14	.457
.50 - .59	1	1	5	0	1	0	3	11	.284
.40 - .49	1	1	2	1	0	1	0	6	.148
.30 - .39	1	0	2	0	0	1	1	5	.074
.20 - .29	0	0	0	0	0	1	0	1	.012
.10 - .19	0	0	0	0	0	0	0	0	.000
.00 - .09	0	0	0	0	0	0	0	0	.000
TOTALS[**]	17	7	17	6	7	15	12	81	

[*] The titles of the seven OAI sections were as follows: (1) Information Received, (2) Mental Activities, (3) Physical Work Behavior, (4) Representational Work Behavior, (5) Interpersonal Work Behavior, (6) Work Goals, and (7) Work Context.

[**] A column total represents the number of factors that were rotated and the number of congruence coefficients in the distribution.

sections. In most instances, examples of jobs receiving the highest factor scores on these dimensions are noted in order to make the interpretations clearer.

Dimensions of Information Received

The principal components analysis of the work elements within the Information Received section of the OAI yielded 17 factors which accounted for 69 percent of the total variance. As shown in Table 3, all of these dimensions were interpreted.

Dimension A-1: Electrical/electronic information. The first factor emerging from this section emphasizes both direct and indirect information pertaining to electrical/electronic devices and systems. All of the items having substantial loadings on this factor except one, Conductivity (Item 45i), are contained in the OAI group entitled Electrical and Electronic Information. Jobs receiving high scores on this factor include electrical aircraft mechanic, factory maintenance man, nuclear engineer, senior communications electrician, electronic subassemblies inspector, precision assembly mechanic (aircraft mfg.), electrician A (mach. shop), electrician helper, and electronics mechanic.

Dimension A-2: Indirect business/sales information. This dimension deals with business/sales information obtained from written verbal and numerical material, graphs, charts, etc. Examples of jobs receiving high scores on this dimension include: sales manager, technical reporting analyst, material scheduler, controller, administrative assistant, salesman (construction machinery), and premium and commission accounting manager (insurance).

Dimension A-3: Environmental information. This dimension corresponds closely to the OAI section of the same title. The items loading substantially deal with direct and indirect information regarding the outdoor environment. Examples of jobs which received high scores on this dimension include: vegetable grower, farm foreman, forester aide, hydrologist, chemical engineer, grass farmer, forester, general farmer, berry grower, and logging manager.

Dimension A-4: Written technical information. The work elements comprising this dimension emphasize written information of a technical nature. Although Item 17i (Regulation and control of electrical/electronic systems) received a significant negative loading, as opposed to the positively loading items characterizing this dimension, neither the magnitude of the loading nor the nature of the element seemed to justify a bipolar interpretation. Jobs receiving high factor scores on this dimension include precision assembly mechanic, tool designer, cost analysis engineer, thermodynamics engineer, engineering aide, nuclear engineer, maintainability design engineer, metallurgical technologist, and tests superintendent.

Table 3. Dimensions of Information Received

	Work Dimension	Rotated Loading[a]
Dimension A-1: Electrical/electronic information.		
16i	Malfunctions of electrical/electronic parts	.89
15i	Interrelations or interconnections of electrical/electronic parts	.87
19i	Electrical/electronic symbols and codes	.86
21i	Electrical/electronic test equipment and measuring devices	.84
13i	Overall performance of electrical/electronic devices	.83
18i	Electrical/electronic schematics and diagrams	.82
22i	Written material pertaining to electrical/electronic devices	.81
14i	State of preventive maintenance (electrical equipment)	.79
20i	Displays conveying electrical/electronic information	.78
23i	Written materials pertaining to basic principles of electricity	.76
45i	Conductivity (materials)	.70
17i	Regulation and control of electrical/electronic systems	.69
Dimension A-2: Indirect business/sales information.		
98i	Business graphs, charts, or diagrams	.81
99i	Written business information	.73
100i	Contracts and other legal written information	.71
97i	Numerical business information	.62
87i	Tables and graphs	.40
95i	Advertising materials	.31

Table 3 (continued)

	Work Dimension	Rotated Loading[a]
Dimension A-3:	Environmental information.	
50i	Plant life	.88
51i	Soil	.88
56i	Environmental emergencies	.86
53i	Water conditions	.79
52i	Terrain and geological features	.76
55i	Weather and atmospheric conditions	.76
59i	Tables and graphs (environmental information)	.56
57i	Charts or maps (environmental information)	.50
Dimension A-4:	Written technical information.	
12i	Written material pertaining to mechanical or physical principles	.63
32i	Written material pertaining to basic principles of structure	.56
8i	Mechanical drawings	.51
11i	Written material pertaining to mechanical devices	.44
23i	Written material pertaining to basic principles of electricity/electronics	.40
49i	Technical written material concerning the physical or chemical properties of materials or substances	.38
10i	Mechanical test equipment and measuring devices	.33
17i	Regulation and control of electrical/electronic systems	-.32
Dimension A-5:	Mechanical information.	
1i	Overall state of mechanical functioning	.89
4i	Malfunction of specific parts or components (mechanical information)	.89

Table 3 (continued)

	Work Dimension	Rotated Loading[a]
Dimension A-5: (continued)		
3i	State of preventive maintenance (mechanical information)	.85
6i	Interrelations of mechanical parts	.82
7i	Mechanical motion	.82
5i	Control or regulation of mechanical devices	.80
2i	Quantity and quality of machine output	.78
9i	Displays (mechanical information)	.62
11i	Written material pertaining to mechanical devices	.52
8i	Mechanical drawings	.44
10i	Mechanical test equipment and measuring devices	.43
12i	Written material pertaining to mechanical or physical principles	.30
Dimension A-6:	Direct health information.	
70i	State of health or hygiene	.91
69i	Dietary needs or deficiencies	.90
73i	Materials and devices related to biology or health	.69
74i	Materials, objects, and devices related to nutrition, sanitation, or food preparation	.58
101i	Physical condition of people	.50
Dimension A-7:	Information concerning the chemical properties of materials.	
44i	Chemical reactivity (materials)	.72
47i	Symbol systems pertaining to materials or substances	.68
48i	Nontechnical written material pertaining to materials or substances	.62

Table 3 (continued)

	Work Dimension	Rotated Loading[a]
Dimension A-7: (continued)		
43i	Hazard: whether the material is a potential cause of bodily harm	.61
49i	Technical written material concerning physical or chemical properties of materials or substances	.57
46i	Materials measuring or testing devices	.53
37i	Physical state (materials)	.44
Dimension A-8:	Information concerning the physical characteristics of materials.	
34i	Surface characteristics (materials)	.72
39i	Consistency (materials)	.67
33i	Overall quality (materials)	.65
38i	Fragility or strength (materials)	.55
40i	Malleability/ductility (materials)	.52
37i	Physical state (materials)	.33
Dimension A-9:	Information pertaining to human behavior and characteristics.	
106i	Knowledge, verbal performance, and experience	.74
112i	Descriptions of individuals	.70
107i	Mood, attitudes, feelings, intentions, desires, etc.	.69
111i	Group settings	.69
104i	Physical performance of people	.64
115i	Tables, diagrams, graphs, etc., conveying information about people	.58
102i	Grooming, style, and poise of people	.56
113i	Characteristics of groups of people and people in general	.56

Table 3 (continued)

	Work Dimension	Rotated Loading[a]
Dimension A-9: (continued)		
101i	Physical condition of people	.44
109i	Emergency situations involving people	.32
Dimension A-10: Clerical information.		
81i	Format, punctuation, or spelling	.92
80i	Correspondence of contents of one manuscript or list with contents of another	.86
82i	Grammar or expression	.78
83i	Proper classification	.76
92i	Numerical or coded information (oral/auditory)	.37
79i	Content or meaning	.35
Dimension A-11: Spatial/structural information.		
24i	Interrelation, position, and fit of connected parts or objects	.82
25i	Connection and fastening of objects and parts	.79
26i	Appearance of assembled or constructed objects in relation to prescribed standards	.76
28i	Drawings, plans, or diagrams pertaining to the arrangement, placement, and fastening of interconnected parts	.59
30i	Measuring and layout devices	.52
31i	Written material pertaining to interrelated parts and objects	.48
32i	Written material pertaining to basic principles of structures	.37

Table 3 (continued)

	Work Dimension	Rotated Loading[a]
Dimension A-12: Numerical/graphic information.		
86i	Frequency of numerical information	.76
84i	Complexity of numbers	.73
85i	Signs and symbols representing numerical operations and relations	.64
87i	Tables and graphs	.44
79i	Content or meaning	.43
89i	Diagrams, drawings, or maps	.38
30i	Measuring and layout devices	.34
46i	Materials measuring or testing devices	.29
92i	Numerical or coded information	.29
Dimension A-13: Direct sales information.		
94i	Merchandise	.76
93i	Money or other medium of exchange	.71
96i	Customers and clients	.71
95i	Advertising materials	.58
91i	Verbal information	.37
107i	Mood, attitudes, feelings, intentions, desires, etc.	.35
Dimension A-14: Art/decorative information.		
61i	Colors and color schemes	.85
62i	Form or shape of objects	.82
63i	Location of objects or people in space for aesthetic purposes	.78

Table 3 (continued)

	Work Dimension	Rotated Loading[a]
Dimension A-15:	Information pertaining to food preparation and service.	
74i	Materials, objects, and devices related to nutrition, sanitation, or food preparation	.42
113i	Characteristics of groups of people and people in general	.37
101i	Physical condition of people	-.29
92i	Numerical or coded information (oral/auditory)	-.34
Dimension A-16:	Topographical information.	
57i	Charts or maps (environmental information)	.55
59i	Tables and graphs (environmental information)	.37
109i	Emergency situations involving people	.36
89i	Diagrams, drawings, or maps (semantic/symbolic)	.35
Dimension A-17:	Information pertaining to physical arrangement and layout.	
29i	Drawings, patterns, or diagrams pertaining to the layout or placement of unconnected parts or objects	.70
27i	Interrelation or arrangement of unconnected objects within a prescribed space or area	.63
48i	Nontechnical written material pertaining to materials or substances	.37

[a] Rotated loadings less than .29 were omitted.

Dimension A-5: Mechanical information. This dimension emphasizes both direct and indirect information concerning the functioning of mechanical systems. The item loadings suggest, however, that the primary concern is with the operation, maintenance, and repair of such devices. In support of this interpretation, jobs receiving high factor scores on this dimension include: horizontal boring-mill set-up operator, power-plant operator, web-press man, airplane captain, service-station mechanic, substation operator, aircraft-and-engine mechanic, inhalation therapist, powder-line repairman, and boat mechanic.

Dimension A-6: Direct health information. The items characterizing this dimension deal with information relevant to the state of health or physical condition of people and animals. All of these work elements involve direct sensory information, rather than semantic/symbolic information. This is also reflected by the jobs receiving high factor scores on this dimension. These jobs include physician, licensed practical nurse, veterinarian, general duty nurse, psychiatric aide, occupational therapy aide, head animal keeper, dentist, and rehabilitation counselor.

Dimension A-7: Information concerning the chemical properties of materials. This dimension is concerned with direct and indirect information pertaining to the chemical properties of materials. Among those jobs receiving high scores on this factor are bio-instrumentation technician, pilot-control operator (chemicals; plastic materials), nuclear engineer, inhalation therapist, process equipment operator, metallurgical technician, pulp bleacher man, chemical operator III, and thermodynamics engineer.

Dimension A-8: Information concerning the physical characteristics of materials. This dimension is somewhat similar to Dimension A-7 (Information concerning the chemical properties of materials) in its concern with the properties of materials. However, here the emphasis seems to be on the quality and physical characteristics of the materials, particularly with respect to their visual or tangible characteristics. Examples of jobs which received high scores on this dimension include: gemologist, metallurgical technician, solid propellant processor, ring stamper, claims adjuster (personal property), weld-pipe mill inspector, forming-machine upkeep man, baker, and arc welder.

Dimension A-9: Information pertaining to human behavior and characteristics. Items loading significantly on this dimension concern the behavior and characteristics of people. All of these work elements are contained in the OAI section entitled Information About People and Animals. Examples of jobs which received high scores on this dimension include: occupational therapist, psychiatric technician, personnel representative, occupational therapy aide, employment clerk, psychiatric aide, secondary school teacher, retail store manager, case worker, and rehabilitation counselor.

Dimension A-10: Clerical information. The work elements comprising this dimension are concerned with information associated with clerical activities. Some of the jobs which received high scores on this factor were: correspondence clerk, columnist, stenographer, encoder, job compositor, transcribing machine operator, typesetter-perforator operator, secretary, policy technician, and corporation lawyer.

Dimension A-11: Spatial/structural information. This dimension is defined by work elements which convey both direct and indirect information pertaining to the interrelationships of connected objects and parts. All of the items loading on this dimension are contained within the section of the OAI entitled Spatial/Structural Information. Some of the jobs with high scores on this dimension include: maintenance pipe fitter, bracket mounter, shipfitter, spar mechanic, furniture designer, fabrication inspector, welder, maintainability design engineer, and maintenance carpenter.

Dimension A-12: Numerical/graphic information. The items loading on this dimension concern information of both a numerical and graphic nature; although the three items with the highest loading deal with numerical information, the factor also includes work elements concerned with diagrams, graphs, drawings, and measuring devices. Jobs receiving high factor scores on this dimension include: survey worker, horizontal boring-mill set-up operator, tool designer, fishing vessel captain, offset-web-press man, insurance underwriter, mathematician, engineering aide II, and field engineer (electronics).

Dimension A-13: Direct sales information. This dimension is composed of items dealing with sales and business information, with the main emphasis on the sales aspect. Moreover, in contrast to Dimension A-2 (Indirect business/sales information), the input seems to be derived primarily through direct contact with customers, merchandise, etc. This interpretation is supported by an examination of the types of jobs that received high scores on this factor. In addition to a variety of sales positions, these jobs include journeyman, groceryman, retail store manager, cafeteria manager, and short-order cook.

Dimension A-14: Art/decorative information. This dimension emphasizes a concern with information of an aesthetic nature derived from colors and color schemes, the form or shape of objects, and the aesthetic arrangement of objects. Examples of jobs receiving high scores on this dimension include: art teacher, furniture designer, cloth designer, store manager, display man, artist (painter), illustrator, clothes designer, and silver saleslady.

Dimension A-15: Information pertaining to food preparation and service. The interpretation of this factor is difficult and can only be made on a tentative basis. However, there appears to be some concern with information pertaining to food preparation and the food preferences of people. Examples of jobs receiving high positive scores on this dimension include: catering manager, dietitian, cafeteria manager, short-order cook, masher (malt liquors), and dairy processing equipment operator.

Dimension A-16: Topographical information. Although this dimension is not very clearly defined, there seems to be some involvement with the use of maps or charts dealing with geographical or topographical layout. Jobs receiving high scores on this factor include: survey worker, fishing vessel captain, columnist, field engineer (electronics), bioinstrumentation technician, airplane captain, osteopath, air-traffic control specialist, area development manager, and forester aide.

Dimension A-17: Information pertaining to physical arrangement and layout. The items characterizing this dimension indicate a concern with information pertaining to the physical arrangement of "unconnected" objects and materials. Both direct and indirect information are involved. Examples of jobs receiving high scores on this factor include: Ludlow-machine operator, nuclear engineer, punch-press operator, salesman (public utilities), production superintendent, advertising production manager, shipfitter, emergency equipment repairman, and field engineer (electronics).

Dimensions of Mental Activities

The principal components analysis of the OAI work elements in the Mental Activities section produced nine factors which accounted for 74 percent of the total variance. All of these dimensions were interpreted and are presented in Table 4.

Dimension B-1: Semantic planning and problem solving. This dimension concerns the use of semantic information in planning and problem solving. According to Guilford (1967), "Semantic information is in the form of meanings to which words commonly become attached; hence, it is most notable in verbal thinking and verbal communication [p. 227]." Semantic planning and problem solving are often associated with administrative, managerial, and supervisory positions, as reflected by the types of jobs receiving high scores on this factor. Among these were: warehouse manager, psychiatrist, substation operator, social welfare administrator, power-plant operator, osteopath, refill assembly foreman, executive vice president of chamber of commerce, farm foreman, claims adjuster, fishing vessel captain, head animal keeper, and assembly foreman (instrument and appliance).

Dimension B-2: Figural perception and problem solving. This factor emphasizes several activities which involve the processing of information pertaining to "things." The items deal with basic perceptual activities (Items 4m, 6m, and 9m) and problem-solving activities (Item 7m). Examples of jobs receiving high scores on this dimension include: electrical aircraft mechanic, horizontal boring-mill set-up operator, maintenance pipe fitter, cost analysis engineer, precision assembly mechanic, module assembler (electronics), subassemblies assembler (electronics), bag machine operator, electric motor assembler, cabinet maker, quality control director, and detail draftsman.

Table 4. Dimensions of Mental Activities

	Work Dimension	Rotated Loading[a]
Dimension B-1:	Semantic planning and problem solving.	
24m	Problem detection (semantic)	.63
28m	Deductive reasoning (semantic)	.58
23m	Problem comprehension (semantic)	.57
34m	Plan elaboration (semantic)	.50
25m	Memory of unitary ideas (semantic)	.38
2m	Object discovery (figural)	.35
32m	Idea expression (semantic)	.34
33m	Idea flexibility (semantic)	.34
31m	Idea production (semantic)	.33
29m	Plan ordering (semantic)	.32
3m	Spatial orientation (figural)	-.30
Dimension B-2:	Figural perception and problem solving.	
9m	Form perception (figural)	.82
7m	Figural problem solving (figural)	.62
6m	Figural memory (figural)	.56
4m	Object visualization (figural)	.42
Dimension B-3:	Symbolic thinking and problem solving.	
16m	Symbolic deduction (symbolic)	.89
19m	Symbolic generation (symbolic)	.87
17m	Symbolic operations sequencing (symbolic)	.79
13m	Symbolic induction (symbolic)	.78
21m	Evaluation of symbolic procedures (symbolic)	.74
12m	Comprehension of symbolic procedures (symbolic)	.71
15m	Numerical computation (symbolic)	.44
28m	Deductive reasoning (semantic)	.33

Table 4 (continued)

	Work Dimension	Rotated Loading[a]
Dimension B-4:	Behavioral information processing.	
22m	Verbal comprehension (semantic)	.59
26m	Memory of idea sequences (semantic)	.58
38m	Group perception (behavioral)	.57
37m	Person perception (behavioral)	.50
29m	Plan ordering (semantic)	.44
25m	Memory of unitary ideas (semantic)	.43
6m	Figural memory	.34
15m	Numerical computation	.31
Dimension B-5:	Figural creativity.	
10m	Aesthetic judgment (figural)	.94
8m	Figural ingenuity (figural)	.72
30m	Idea originality (semantic)	.62
31m	Idea production (semantic)	.29
33m	Idea flexibility (semantic)	.29
Dimension B-6:	Routine semantic/symbolic activities.	
20m	Clerical perception	.84
11m	Spelling	.82
36m	Verbal construction	.36
22m	Verbal comprehension	.32
Dimension B-7:	Work-related preparation and experience.	
40m	Job-related preparation (education and experience)	.78
41m	Work experience (education and experience)	.71
39m	Educational level (education and experience)	.37

Table 4 (continued)

	Work Dimension	Rotated Loading[a]
Dimension B-8: Semantic facility and productivity.		
35m	Associational fluency (semantic)	.75
18m	Word fluency (semantic)	.56
36m	Verbal construction (semantic)	.56
32m	Idea expression (semantic)	.41
37m	Person perception (behavioral)	.37
33m	Idea flexibility (semantic)	.36
31m	Idea production (semantic)	.32
Dimension B-9: Spatial information processing.		
3m	Spatial orientation	.84
5m	Visual tracing	.69
2m	Object discovery	.63
4m	Object visualization	.49

[a] Rotated loadings less than .29 were omitted.

Dimension B-3: Symbolic thinking and problem solving. Guilford defines symbolic information as ". . . information . . . in the form of signs, materials, the elements having no significance in and of themselves, such as letters, numbers, musical notations, and other 'code' elements [1967, p. 227]." This factor emphasizes a variety of symbolic information processing activities which are typically associated with technical and professional work. These activities involve both convergent and divergent symbolic thinking, as well as the cognition and evaluation of symbolic information. Jobs receiving high scores on this factor include: mathematician, chemical engineer, cost analysis engineer, college faculty member, sociologist, engineering and scientific programmer, nuclear engineer, insurance underwriter, systems analyst, and thermodynamics engineer.

Dimension B-4: Behavioral information processing. This factor is defined by work elements from both the semantic and behavioral groups in the OAI. However, the semantic elements seem to center around the worker's dealings with people. Indeed, the jobs with high scores on the factor involve a considerable amount of contact with, and responsibility for, people. Included among these jobs are: catering manager, recreation director, production department foreman, recreation supervisor, rehabilitation counselor, checker I, psychiatric technician, public utilities salesman, credit and collection manager, polymerization foreman, secondary school teacher, corporation president, occupational therapist, hotel clerk, and warehouse manager.

Dimension B-5: Figural creativity. The pattern of loadings on this factor suggests a dimension of visual-figural creativity. According to Guilford (1967), "Figural information is in concrete form, as perceived or as recalled in the form of images. . . . In the visual area, we encounter such properties as color, shape, texture, size, continuity, and dimensionality [p. 22]." Aesthetic Judgment (Item 10m) has the highest loading on this factor, accompanied by significant loadings on four divergent-production items (Items 8m, 30m, 31m, and 33m). This interpretation is further supported by the jobs receiving high scores on this dimension. Among these jobs are: furniture designer, cloth designer, art teacher, hair stylist, clothes designer, artist (painter), gemologist, illustrator, and building designer.

Dimension B-6: Routine semantic/symbolic activities. The items comprising this factor deal with verbal and symbolic activities of a routine, or clerical, nature. Examples of jobs receiving high scores on this factor include: medical secretary, correspondence clerk, transcribing-machine operator, stenographer, proofreader, head catalog librarian, order clerk, typesetter-perforator operator, columnist, and job printer.

Dimension B-7: Work-related preparation and experience. The items loading significantly on this dimension comprise the OAI section entitled Educational and Experiential Requirements. This factor emphasizes experience and preparation in one's field of work. Jobs receiving high scores on this factor include: public utilities commissioner, survey worker, electrical assemblies foreman, hydrologist, general foreman, superintendent of schools, plate manufacturing foreman, catering manager, tests superintendent, chef, college faculty member, forester, airplane captain, and sales manager.

Dimension B-8: Semantic facility and productivity. With one exception, the variables characterizing this dimension deal with semantic information processing. Semantic productivity is emphasized, since five of the seven significant items fall under that OAI heading. The significant loading on Item 37m (Person perception) indicates some direct involvement with other persons, although this would appear to be incidental in the interpretation of the factor. An examination of the jobs receiving high factor scores helps clarify this interpretation. These jobs include: columnist, sociologist, author, college faculty member, area development manager, credit and collection manager, corporation president, recreation director, clergyman, and personnel services coordinator.

Dimension B-9: Spatial information processing. This factor appears to emphasize the processing of information pertaining to spatial relations, in terms of both self-orientation (3m) and the relationships among objects (4m). The items dealing with visual tracing (5m) and object discovery (2m) support this interpretation, since these mental activities could be expected to occur in situations requiring spatial information processing. Jobs receiving high scores on this dimension include: fishing vessel captain, wire drawer, chief pilot, pairing-machine operator, weaver, cable maker, shipfitter, harvest hand, floor rolling carpenter, knitting-machine operator, pipe-making welder, arc welder, logging manager, printer-slotter operator (paper goods), and automobile-service-station attendant.

Dimensions of Physical Work Behavior

A principal components analysis of the work elements comprising the Physical Work Behavior section of the OAI resulted in 20 dimensions which accounted for 49 percent of the total variance. All of these dimensions were interpreted and are presented in Table 5.

Dimension C-1: General physical versus sedentary activities. This dimension emphasizes a wide range of physical activities requiring strength and, to a lesser extent, dexterity. The substantial negative loading on Item 15a (Sitting)--contrasted with the positive loading of the other items--suggests a bipolar structure. Examples of jobs receiving high positive factor scores include: bricklayer helper, cargo agent, boilermaker, fisherman, boat mechanic, fishing vessel captain, farm-equipment mechanic, and carpenter helper. Jobs with high negative factor scores were metallurgical technician, grid operator (electronics), semiconductor assembler, mounter I (electronics), thermodynamics engineer, subassemblies inspector, and ticket seller.

Dimension C-2: Machine control operations. This factor loads on all but one of the OAI items under Setting/Control Devices, and other work elements marking the factor are associated with control operations. Although mechanized equipment operation is emphasized, the factor extends beyond this activity, as evidenced by the high factor scores received by the jobs of bottom ironer (boot and shoe) and stenographer. Other jobs receiving high factor scores include: gasoline truck operator, routeman (wholesale ice cream), cargo agent, feeder (agricultural), leather products salesman, power-plant operator, airplane captain, and vegetable grower.

Dimension C-3: Electrical and mechanical repair and maintenance. This dimension emphasizes the maintenance and repair of electrical equipment and machines other than mechanized equipment. There is some indication that the machine involvement is of an electrochemical nature. Examples of jobs receiving high factor scores on this dimension include: factory maintenance man, precision assembly mechanic, substation operator, powder-line repairman, electrical-appliance serviceman, aircraft mechanic (electrical), packaging-machine mechanic, electrician "A" (machine shop), and building maintenance man.

Table 5. Dimensions of Physical Work Behavior

	Work Dimension	Rotated Loading[a]
Dimension C-1:	General physical versus sedentary activities.	
19a	General body strength	.72
18a	Finger/hand/arm strength	.52
20a	Explosive strength	.51
16a	Kneeling/stooping/crawling	.49
44a	Material and object handling	.43
65t	Handling/supporting (stationary machines and equip)	.42
14a	Standing	.42
45t	Non-powered wheeled equipment (portable)	.40
5a	Manual dexterity	.35
43t	Supporting (portable non-powered)	.30
15a	Sitting	-.58
Dimension C-2:	Machine control operations.	
80t	Foot-operated (continuous settings)	.69
82t	Foot-operated (discrete controls)	.69
78t	Foot-operated (discrete settings)	.57
84t	Foot-operated (continuous controls)	.44
*	Ear-hand or ear-foot coordination	.44
83t	Hand-operated (continuous controls)	.40
26a	Driving/operating (machine related)	.39
71t	Off-road vehicles (mechanized equipment)	.35
70t	Medium/light highway vehicles (mechanized equip)	.34
7a	Reaction time	.33
81t	Hand-operated (discrete controls)	.32
8a	Multilimb coordination	.32
79t	Hand-operated (continuous settings)	.30

Table 5 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C-3:	Electrical and mechanical repair and maintenance.	
30a	Diagnosing/troubleshooting	.80
27a	Repairing	.77
29a	Adjusting/tuning	.72
28a	Servicing	.68
87t	Electrical (measurement)	.58
32j	Electrical/electronic equipment and components	.58
31j	Machines and mechanical components, excluding transportation and mechanized equipment	.53
51a	Handling	.47
32a	Installing/connecting	.42
6t	Mechanical fastening (non-powered)	.34
49a	Inspecting	.34
33t	Perforating/boring (portable powered)	.32
Dimension C-4:	Combining/separating processed substances and materials.	
39a	Combining/separating (material modifying)	.84
64t	Combining/separating (stationary machines and equipment)	.79
14j	Chemical and petroleum materials and substances	.55
85t	Weight/volume (measurement)	.45
47a	Monitoring	.40
88t	Pressure/temperature (measurement)	.39
42a	Heat or pressure treating, except in forming	.36
40a	Chemically treating	.35
Dimension C-5:	Physical coordination.	
1a	Eye-hand coordination	.59
10a	General body coordination	.55

Table 5 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C-5:	(continued)	
8a	Multilimb coordination	.53
4a	Finger dexterity	.50
7a	Reaction time	.48
5a	Manual dexterity	.47
9a	Balance	.45
2a	Control precision	.44
18a	Finger/hand/arm strength	.36
17a	Lying	-.38
Dimension C-6:	Stationary material-removing machine operation.	
58t	Drilling/perforating (stationary machines and equipment)	.62
36a	Material shaping	.62
9j	Metal, excluding precious metals	.57
59t	Shaping (stationary machines and equipment)	.56
60t	Grinding (stationary machines and equipment)	.56
49t	Cutting by shearing (stationary machines and equipment)	.43
86t	Physical extent (measurement)	.40
25a	Operating/controlling (machine related)	.40
47t	Cutting by sawing (stationary machines and equip)	.38
92t	Work layout	.35
61t	Forming (stationary machines and equipment)	.29
Dimension C-7:	Activities involving physical contact with people or animals.	
53a	Physical treatment, excluding surgery	.73
51a	Handling	.68
2j	Animals and marine life	.58

Table 5 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C-7: (continued)		
20t	Degree of precision in hand tool usage	.35
93t	Optical devices	.33
Dimension C-8: Sewing, stitching, and related activities.		
54t	Stitching, knitting, and weaving (stationary machines and equipment)	.80
35a	Fiber/thread working	.80
72j	Textile, leather, and related synthetic parts	.62
2t	Cutting by shearing (non-powered)	.54
16j	Textile and leather materials, including synthetics	.53
7t	Stitching/wiring (non-powered)	.47
84t	Foot-operated (continuous controls)	.35
Dimension C-9: Precision work involving small or fragile objects and materials.		
46a	Precision working	.40
44j	Fabricated products of miscellaneous materials, not elsewhere defined	.37
44a	Material and object handling	.34
49a	Inspecting	.33
10a	General body coordination	-.34
9a	Balance	-.43
Dimension C-10: Preparation/modification of surfaces.		
9t	Abrading/polishing (non-powered)	.75
38a	Surface finishing	.66
4t	Cutting by abrasion (non-powered)	.60

Table 5 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C-10: (continued)		
57t	Abrading (stationary machines and equipment)	.52
10t	Scraping (non-powered)	.44
8t	Liquid application/coating (non-powered)	.32
43a	Cleaning	.30
Dimension C-11: Precision assembling.		
32j	Electrical/electronic equipment and components	-.30
20j	Pre-fabricated construction components of metal and concrete	-.30
4a	Finger dexterity	-.30
33t	Perforating/boring (portable powered)	-.32
13t	Perforating/boring (non-powered)	-.32
87t	Electrical (measurement)	-.33
42t	Holding (portable non-powered)	-.35
22j	Mechanical parts	-.38
46a	Precision working	-.39
29t	Mechanical fastening (portable powered)	-.43
41t	Degree of precision in portable powered tool/ equipment usage	-.47
23j	Electrical/electronic parts and components	-.58
26t	Fusion (portable powered)	-.59
34a	Assembling	-.66
Dimension C-12: Cutting/processing food materials.		
3t	Cutting by blade (non-powered)	.62
19j	Processed foods, which require further preparation	.53
50t	Cutting by blade (stationary machines and equipment)	.46

Table 5 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C-12:	(continued)	
7j	Non-processed or minimally-processed animal materials	.45
1t	Cutting by sawing (non-powered)	.32
Dimension C-13:	Material forming.	
37a	Material forming	.74
61t	Forming (stationary machines and equipment)	.73
11t	Forming (non-powered)	.61
14t	Handling (non-powered)	.38
11j	Earth materials (processed)	.34
12j	Rubber, plastic, and related synthetic materials	.33
Dimension C-14:	Construction and woodworking activities.	
10j	Lumber and related materials	.68
33a	Construction/building	.55
13j	Surface preparation and bonding substances	.51
47t	Cutting by sawing (stationary machines and equip)	.51
1t	Cutting by sawing (non-powered)	.45
12t	Shaping (non-powered)	.44
21t	Cutting by sawing (portable powered)	.43
5t	Bonding/sealing (non-powered)	.41
92t	Work layout	.38
33t	Perforating/boring (portable powered)	.32
31a	Laying/covering (connecting/attaching)	.32
26j	Miscellaneous wooden parts, excluding construction components	.32
13t	Perforating/boring (non-powered)	.31
11j	Earth materials	.30

Table 5 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C-15:	Agricultural activities.	
2j	Animals and marine life	-.32
70t	Medium/light highway vehicles	-.47
1j	Plant life	-.72
45a	Earth working	-.75
16t	Earth working (non-powered)	-.78
Dimension C-16:	Measuring/testing.	
91t	Physical characteristics (measurement)	.57
90t	Motion/force (measurement)	.48
31a	Laying/covering (connecting/attaching)	.39
50a	Testing	.37
34j	Equipment/systems, not elsewhere defined	.36
93t	Optical devices	.35
88t	Pressure/temperature (measurement)	.31
86t	Physical extent (measurement)	.29
25j	Miscellaneous metal parts, excluding mechanical and electrical parts and construction components	.29
Dimension C-17:	Liquid application/coating.	
30t	Liquid application/coating (portable powered)	.45
8t	Liquid application/coating (non-powered)	.44
17j	Paper and paper materials	.41
5t	Bonding/sealing (non-powered)	.40
29t	Mechanical fastening (portable powered)	.30
Dimension C-18:	Heavy equipment operation.	
67t	Heavy equipment (mechanized equipment)	.63
26a	Driving/operating	.53

Table 5 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C-18:	(continued)	
3a	Tracking	.49
84t	Foot-operated (continuous controls)	.45
5j	Non-processed geological materials	.45
83t	Hand-operated (continuous controls)	.40
81t	Hand-operated (discrete controls)	.34
Dimension C-19:	Pressing rubber, plastic, and related synthetic materials	
42j	Rubber and plastic products	.52
12j	Rubber, plastic, and related synthetic materials	.49
28j	Miscellaneous parts of materials other than metal, wood, or textiles--such as rubber, plastic, fiberglass, ceramics, etc.	.39
63t	Pressing (stationary machines and equipment)	.35
15t	Cleaning (non-processed)	-.32
Dimension C-20:	Activities related to heat and chemical treatment.	
56t	Liquid application/coating (stationary machines and equipment)	.56
24a	Tending (machine related)	.52
62t	Heat application (stationary machines and equip)	.51
75t	Material conveyors (mechanized equipment)	.46
42a	Heat or pressure treating, except in forming	.45
6j	Non-processed woods	.45
40a	Chemically treating	.37
77t	Hand-operated (discrete settings)	.34

[a] Rotated loadings less than .29 were omitted.

*This item has since been deleted from the OAI.

Dimension C-4: Combining/separating processed substances and materials. This dimension emphasizes the combining and separating of processed materials, particularly chemicals. Two elements dealing with measurement and monitoring activities are included, in addition to the items pertaining to material/substance treatment. Jobs receiving high scores on this dimension include: chemical operator III, twitchell operator (chemical), baker, banbury-mixer operator, finish mixer (textile), extractor operator (solvent process), medical technologist, polymerization foreman (plastic materials), and pilot-control operator (chemicals; plastic materials).

Dimension C-5: Physical coordination. The work elements characterizing this dimension describe activities concerned with various types of bodily coordination. Moreover, the single negative loading on Item 17a (Lying) is consistent with this interpretation. Examples of jobs receiving high positive scores on this dimension include: pairing-machine operator, weaver, monotype keyboard operator, record-press tender, power-lawn mower assembler, outboard motor assembler, fishing vessel captain, and harvest hand.

Dimension C-6: Stationary material-removing machine operation. The various elements loading on this dimension seem to focus upon the operation of stationary machines that remove or part material through shaping, drilling, grinding, and cutting. These items describe a variety of machine-related operations and associated activities involved in the modification of metal materials. Jobs receiving high scores on this dimension include: metal fabricator I, shipfitter, horizontal boring-mill set-up operator (machine shop), turret-lathe set-up operator (machine shop), machinist I, shift foreman (iron & steel), ludlow-machine operator (print. & pub.), factory maintenance man helper, and stereotyper.

Dimension C-7: Activities involving physical contact with people or animals. This dimension is characterized by work activities which involve some type of physical action upon people or animals. Examples of jobs receiving high scores on this factor include: artificial breeding technician, veterinarian, farm hand (livestock), physical therapist, lifeguard, hair stylist, physician, general duty nurse, rehabilitation counselor, and head animal keeper.

Dimension C-8: Sewing, stitching, and related activities. The items comprising this dimension define a rather specific domain of activity which centers around the type of materials acted upon (i.e., textile, leather, and related synthetic materials). The nature of this dimension is further indicated by the type of jobs receiving high factor scores. These jobs include: knitting-machine operator, seamstress, tailor, furniture upholsterer, weaver, sewing-machine operator, binder II, patternmaker, and hemmer.

Dimension C-9: Precision work involving small or fragile objects and materials. Although this dimension is not very clearly defined, it appears to involve precision working on small or fragile products and materials (e.g., jewelry, pottery, porcelain, etc.). Examples of jobs receiving high positive scores on this factor include: gemologist, automatic blocker (glass mfg.; mirror), decorator (pottery and porcelain), dental ceramist, stone cutter (jewelry), silverware finisher, and dentist.

Dimension C-10: Preparation/modification of surfaces. This dimension contains a variety of work elements involved in the preparation and modification of object surfaces, including surface finishing, abrading, polishing, and scraping. Among the jobs receiving high scores on this dimension were metallurgical technician, ludlow-machine operator (print. & pub.), jewelry polisher, hand sander (woodworking), automobile-body repairman, floor-rolling carpenter, ring stamper, boat mechanic, and hand decorator.

Dimension C-11: Precision assembling. The combination of work elements defining this dimension suggests precision and dexterity in assembly activities. This interpretation is supported by an examination of the factor scores for jobs. Examples of jobs receiving high scores on this dimension include: electric motor assembler, semiconductor assembler, mounter I (electronics), electronics assembler, electronic-sensing-equipment assembler, power-lawn mower assembler, outboard motor assembler, boat mechanic, and electrician.

Dimension C-12: Cutting/processing food materials. The elements characterizing this dimension describe several means of cutting materials, particularly food materials. Among the jobs receiving high scores on this factor are meat cutter, chef, head butcher, short-order cook, fish cleaner, food service worker II, seasoning mixer, and baker.

Dimension C-13: Material forming. This dimension reveals a clear emphasis on activities involved in forming materials, particularly earth, plastic, and related synthetic materials. Examples of jobs receiving high scores on this dimension include: floor and bench molder (foundry), compression-molding machine tender, forming-machine upkeep man, injection-molding machine tender, ludlow-machine operator, punch-press operator, and die-casting-machine operator.

Dimension C-14: Construction and woodworking activities. The elements comprising this dimension describe various activities and materials involved in construction and woodworking. Jobs receiving high scores on this factor include: carpenter (construction), maintenance carpenter helper, cabinet maker, bricklayer helper, dovetail machine operator (woodworking), gang sawyer, shipfitter, and fireworks assembler.

Dimension C-15: Agricultural activities. This dimension emphasizes manual earth working activities as well as the care of plant and animal life. Among the jobs receiving high scores on this factor were farm foreman, vegetable grower, general farmer, berry grower, forester, groundskeeper, and several farm hands.

Dimension C-16: Measuring/testing. The elements comprising this dimension emphasize the use of various types of measurement and testing devices. Examples of jobs receiving high scores on this dimension include: bio-instrumentation technician, thermodynamics engineer, metallurgical technician, offset-web-press man, utility man (flooring), nuclear engineer, routeman, fabrication inspector, floor rolling carpenter, and process equipment operator.

Dimension C-17: Liquid application/coating. This dimension is marked by a number of work elements involving the application of liquids to materials and objects (including people and animals). A variety of jobs received high scores on this dimension, including: assistant product development man (paper goods), floor rolling carpenter, power-lawn mower assembler, outboard motor assembler, osteopath, painter (maintenance), offset-web-press man, and printer-slotter operator (paper goods).

Dimension C-18: Heavy equipment operation. This dimension seems somewhat similar to Dimension C-2 (Machine control operations) in its concern with control devices and mechanized equipment. However, unlike Dimension C-2, the emphasis here is on the operation of heavy mobile work equipment. The jobs receiving high scores on this factor include: power shovel operator, log stacker operator, operating engineer II (construction), scraper operator, locomotive crane operator, general farm hand, panelboard operator (mining & quarrying), sand-slinger operator, fork-lift-truck operator, and gang sawyer.

Dimension C-19: Pressing rubber, plastic, and related synthetic materials. This dimension is rather narrowly defined in terms of both the activity involved (pressing) and the materials being acted upon (rubber, plastic, and related synthetics). Among the jobs receiving the highest scores on this factor were flexographic pressman I (printing & publishing), machine bottom ironer (boot & shoe), injection-molding-machine tender (fabrication, plastic products), foreman (finish flooring), chemical laboratory technician, and utility man (flooring).

Dimension C-20: Activities related to heat and chemical treatment. The work elements marking this dimension reveal an involvement with stationary machines and equipment for the purpose of treating materials with heat, chemicals, or pressure. Examples of jobs that received high scores on this factor include: treating engineer (wood preserving), pulp-bleacher man, process equipment operator, machine silver stripper (mirror), plater (pen & pencil), spray-machine operator (pottery & porcelain), solid propellant processor, and kiln burner (brick & tile).

Dimensions of Representational Work Behavior

Seven dimensions, accounting for 72 percent of the total variance, emerged from the principal components analysis of the work elements comprising this section of the OAI. Of these seven factors, five were interpreted. The dimensions of Representational Work Behavior are presented in Table 6.

Table 6. Dimensions of Representational Work Behavior

	Work Dimension	Rotated Loading[a]
Dimension D-1:	Verbal communication.	
30r	Personalness of subject matter	.89
16r	Speaking	.88
17r	Speaking: Level of skill or difficulty	.85
28r	Communication ratio	.84
18r	Ordinary conversational English	.81
31r	Formality or structure of communicative interaction	.75
29r	Communication precision	.72
15r	Writing: Level of difficulty	.47
7r	Voice transmission and storage devices	.45
14r	Writing	.40
38r	Analyzing	.32
19r	Formal, grammatically correct English	.29
Dimension D-2:	Numerical/clerical activities.	
26r	Communicates with numbers	.79
33r	Copying/recording	.78
35r	Calculating/computing	.66
32r	Comparing/checking	.64
34r	Classifying/categorizing	.62
27r	Complexity of numerical information communicated	.61
1r	Writing devices	.54
14r	Writing	.54
36r	Calculating/computing: Level of difficulty	.46
37r	Compiling	.44
15r	Writing: Level of difficulty	.38
10r	Mechanical computing devices	.37
3r	Keyboard devices	.29

Table 6 (continued)

	Work Dimension	Rotated Loading[a]
Dimension D-3:	Technical drawing.	
2r	Drawing devices	.92
25r	Communicates by drawing	.86
9r	Hand computing devices	.36
36r	Calculating/computing: Level of difficulty	.31
35r	Calculating/computing	.29
Dimension D-4:	Use of office equipment.	
6r	Office reproducing devices	.78
3r	Keyboard devices	.74
10r	Mechanical computing devices	.40
7r	Voice transmission and storage devices	.36
34r	Classifying/categorizing	.32
Dimension D-5:	Technical/symbolic information processing and communication.	
36r	Calculating/computing: Level of difficulty	-.30
19r	Formal, grammatically correct English	-.40
38r	Analyzing	-.46
9r	Hand computing devices	-.49
39r	Synthesizing	-.56
20r	Technical terms	-.71
23r	Communicates with special written codes	-.78
Dimension D-6:	Unnamed.	
22r	Signals by visual means	.89

Table 6 (continued)

Work Dimension		Rotated Loading[a]
Dimension D-7: Unnamed.		
8r	Audio-visual transmission and storage devices	.93

[a]Rotated loadings less than .29 were omitted.

Dimension D-1: Verbal communication. The work elements loading on this dimension pertain to oral and written communication, with the major emphasis on activities related to the former. Among the jobs receiving high scores on this factor are occupational therapist, clergyman, psychiatrist, columnist, physical therapist, accounting manager (insurance), personnel services coordinator, recreation director, rehabilitation counselor, and executive vice president of the chamber of commerce.

Dimension D-2: Numerical/clerical activities. This dimension seems to emphasize numerical activities performed in a clerical setting. This interpretation is supported by an examination of the factor scores for jobs. Jobs receiving high scores on this dimension include: billing-control clerk, wires-transfer clerk (banking), bookkeeper I, racing secretary and handicapper, invoice-control clerk, tabulating machine operator, production clerk, accountant, transit clerk (banking), and encoder (banking).

Dimension D-3: Technical drawing. This dimension emphasizes drawing and, to a lesser extent, calculating/computing. The type of jobs receiving high scores on this factor suggests that these activities are of a technical nature. Included among these jobs are: nuclear engineer, thermodynamics engineer, tool designer, maintainability design engineer, furniture designer, engineering aide, cloth designer, detail draftsman, and survey worker.

Dimension D-4: Use of office equipment. This dimension emphasizes the use of various representational devices. An involvement with record keeping can be inferred from the type of jobs receiving high scores on this factor. Among these jobs are: checker I, columnist, chief time keeper, proof-machine operator (banking), stenographer, head teller, wires-transfer clerk (banking), general office clerk, hotel clerk, and hydrologist.

Dimension D-5: Technical/symbolic information processing and communication. This dimension emphasizes the processing and communication of technical terms and codes and related activities such as synthesizing, analyzing, and calculating/computing. Jobs receiving high scores on this factor include: nuclear engineer, college faculty member, chemical operator III, wires-transfer clerk (banking), thermodynamics engineer, chemical engineer, organic chemist, bio-instrumentation technician, and hydrologist.

Dimensions D-6 and D-7: Unnamed. Since only one item marks each of these two factors, they have not been interpreted.

Dimensions of Interpersonal Work Behavior

The principal components analysis of this section of the OAI produced eight factors accounting for 75 percent of the total variance. All of these factors were interpreted and are presented in Table 7.

Dimension E-1: Supervisory activities. This dimension loads heavily on supervisory activities such as organizing, evaluating, disciplining, and close and general supervision of subordinates. As would be expected, those jobs receiving the highest scores on this factor included various types of managers, supervisors, and foremen.

Dimension E-2: Customer service activities. This dimension seems to deal with activities in which the incumbent provides some service to customers. This is reflected by the types of jobs receiving high factor scores. These jobs include telephone-answering-service operator, hotel recreation director, hotel clerk, head teller, baggageman, ticket agent, order clerk (food & beverages), restaurant hostess, passenger car conductor (railroad transportation), and automat-car attendant (railroad transportation).

Dimension E-3: Consultation activities. This dimension emphasizes activities in which the incumbent consults with and advises others. The significant loadings of Items 12p and 29p suggest that the incumbent also seeks advice from others. Jobs receiving high factor scores on this dimension include: psychiatrist, technical reporting analyst, osteopath, personnel services coordinator, columnist, rehabilitation counselor, executive vice president of the chamber of commerce, and policy technician.

Dimension E-4: Subordinate activities. This dimension concerns interpersonal activities typically associated with subordinate status. Although only two work elements mark the factor, the nature and magnitude of their loadings seems to justify this interpretation. Examples of jobs receiving high scores on this dimension include: first helper on electric furnace, ram press operator helper, coverer helper (sports equipment), electrician helper, factory maintenance man helper, checker I, and grain elevator man.

Table 7. Dimensions of Interpersonal Work Behavior

	Work Dimension	Rotated Loading[a]
Dimension E-1:	Supervisory activities.	
10p	Disciplining	.94
8p	Personnel actions	.93
9p	Organizing	.93
27p	Interacts with subordinates	.90
7p	Evaluating	.88
5p	Close supervision	.82
6p	General supervision	.72
21p	Pacifying/placating	.31
Dimension E-2:	Customer service activities.	
31p	Interacts with the general public	.78
2p	Serving/catering	.66
11p	Giving information to others	.58
30p	Interacts with customers	.52
12p	Obtaining information from others	.33
Dimension E-3:	Consultation activities.	
29p	Interacts with consultants or advisors	.86
12p	Obtaining information from others	.56
16p	Advising/counseling	.46
28p	Interacts with clients or patients	.35
Dimension E-4:	Subordinate activities.	
25p	Interacts with superiors	.84
3p	Directions received: Degree of specificity	.74

Table 7 (continued)

	Work Dimension	Rotated Loading[a]
Dimension E-5: Teaching/instructing.		
32p	Interacts with students	.93
15p	Teaching/instructing	.75
13p	Demonstrating	.37
Dimension E-6: Selling.		
14p	Persuading	.84
13p	Demonstrating	.73
30p	Interacts with customers	.65
Dimension E-7: White-collar personal service activities.		
23p	Diverting/entertaining	.79
20p	Debating/discussing	.69
21p	Pacifying/placating	.53
16p	Advising/counseling	.38
Dimension E-8: Assisting superiors.		
1p	Assisting	.91
28p	Interacts with clients or patients	.40
2p	Serving/catering	.30

[a] Rotated loadings less than .29 were omitted.

Dimension E-5: Teaching/instructing. A concern with activities related to teaching or instructing is clearly indicated by the items in this factor and is further reflected by the types of jobs receiving high factor scores. Examples of these jobs are: college faculty member, art teacher, personal service representative (telephone and telegraph), bridge instructor, athletic coach, chief pilot, secondary school teacher, music teacher, and occupational therapist.

Dimension E-6: Selling. The three work elements loading substantially on this dimension pertain to activities involved in sales positions, and the factor scores for jobs are in accord with this interpretation. Among the jobs receiving high factor scores are: gemologist, home service representative (telephone and telegraph), catering manager, and a variety of sales jobs.

Dimension E-7: White-collar personal service activities. This factor involves a variety of interpersonal activities related to personal service. These activities range from conflict resolution (20p) to diverting and entertaining (23p). In accordance with the range of activities defining this dimension, a variety of jobs received high factor scores. Among these are: claims adjuster, hotel recreation director, credit manager, premium and commission accounting manager (insurance), leather products salesman, recreation supervisor, executive vice president of the chamber of commerce, social welfare administrator (YMCA), psychiatrist, and trading stamps salesman.

Dimension E-8: Assisting superiors. Although this dimension is not well defined, it appears to involve providing assistance to superiors. Moreover, this interpretation is supported by the jobs that received high scores on the factor. These jobs include: occupational therapy aide, surgical technician, dental assistant, fitting room checker (retail trade), inhalation therapist, first helper on electric furnace, ram press operator helper, coverer helper, and electrician helper.

Dimensions of Work Goals

The principal components analysis of the OAI work elements in this section yielded a total of 16 dimensions which explained 63 percent of the total variance. All 16 of these dimensions were interpreted. The dimensions of Work Goals are presented in Table 8 and are discussed in the following paragraphs.

Dimension F-1: Bookkeeping objectives. This dimension is defined by a variety of work elements dealing with numerical and symbolic objectives, particularly those related to business data. Examples of jobs receiving high loadings on this dimension include: bookkeeper I, head teller, checker I, wires-transfer clerk (banking), invoice-control clerk, stock clerk, chief time keeper, checker II, billing-control clerk, transit clerk (banking), and accountant.

Dimension F-2: Electrical/electronic objectives. The work elements with substantial loadings on this dimension comprise the OAI section entitled Electrical Objectives in its entirety. The major emphasis is on objectives pertaining to the maintenance or restoration of proper electrical/electronic functioning. Also important, although to a lesser degree, are objectives pertaining to the assembly, installation, and regulation or control of electrical/electronic devices. Of still less, yet significant, concern are objectives related to electrical/electronic schematics or diagrams, written communication of

Table 8. Dimensions of Work Goals

	Work Dimension	Rotated Loading[a]
Dimension F-1:	Bookkeeping objectives.	
81g	Recorded or transcribed numerical data	.76
79g	Solutions to standard arithmetic problems	.73
82g	Numerical data displayed	.66
94g	Balanced, verified, or updated business/organizational records	.65
72g	Routine written output	.49
83g	Numerical information orally communicated	.47
88g	Semantic/symbolic material verified	.45
89g	Completed sales or business/organizational transactions	.40
76g	Written material categorized	.32
96g	Business/organizational data gathered, compiled, or displayed	.30
90g	Merchandise shelved, packaged, stored, demonstrated, or otherwise handled	.29
Dimension F-2:	Electrical/electronic objectives.	
13g	Causes of electrical/electronic malfunction located or identified	.90
14g	Electrical/electronic functioning maintained	.90
15g	Electrical/electronic functioning restored	.90
12g	Substandard conditions of electrical/electronic devices detected	.85
18g	Satisfactory output from electrical/electronic devices	.85
17g	Electrical/electronic devices regulated, adjusted, or controlled	.83
16g	Electrical/electronic devices installed or assembled	.72
19g	Electrical/electronic schematics and/or diagrams	.60

Table 8 (continued)

	Work Dimension	Rotated Loading[a]
Dimension F-2:	(continued)	
21g	Written communication of electrical/electronic information	.47
20g	Electrical/electronic innovations or plans	.38
Dimension F-3:	Graphic/semantic technical objectives.	
39g	Drawings or diagrams of constructed, assembled, modified, fabricated, or arranged objects/materials	.85
11g	Written communication of mechanical information	.79
10g	Mechanical plans or innovations	.78
9g	Mechanical drawings	.75
84g	Completed diagrams, charts, and maps	.68
37g	Written communications pertaining to construction, installation, or spatial arrangement	.64
35g	Innovations or plans in construction, installation, or spatial arrangement of objects	.62
36g	Innovations or plans in assembly, fabrication, or material modification	.61
38g	Written communications pertaining to material/object modification, assembly, or fabrication	.52
80g	Solutions to advanced mathematical problems	.52
19g	Electrical/electronic schematics and/or diagrams	.35
Dimension F-4:	Mechanical objectives.	
2g	Causes of mechanical malfunction located or identified	.88
4g	Proper mechanical functioning restored	.86
3g	Mechanical functioning maintained	.84
1g	Substandard conditions of mechanical devices detected	.83
6g	Satisfactory output from mechanical devices	.68

Table 8 (continued)

	Work Dimension	Rotated Loading[a]
Dimension F-4:	(continued)	
7g	Properly regulated or controlled mechanical devices	.66
5g	Mechanical devices installed or assembled	.64
Dimension F-5:	Objectives related to the behavior of others.	
107g	Enjoyment, satisfaction, or mood change of others	-.31
77g	Oral information communicated	-.32
104g	Others' compliance with directions, rules, or laws insured or monitored	-.45
103g	Attitude, opinion, or belief change in others	-.49
108g	Innovations or plans pertaining to people	-.58
101g	Physical competence of others improved or assessed	-.72
105g	Improved adjustment or adaptation of others	-.74
102g	Others' knowledge improved or assessed	-.75
Dimension F-6:	Spatial arrangement objectives.	
33g	Spatially arranged objects	.78
34g	Properly located or placed objects	.77
57g	Aesthetically arranged objects or things	.57
90g	Merchandise shelved, packaged, stored, demonstrated, or otherwise handled	.46
Dimension F-7:	Health objectives.	
100g	Improved state of grooming or appearance of people	-.57
66g	Medically related service tasks completed	-.69

Table 8 (continued)

	Work Dimension	Rotated Loading[a]
Dimension F-7: (continued)		
63g	Causes or potential causes of health problems identified	-.71
70g	Written biological/health communication completed	-.73
Dimension F-8: Material/substance treatment objectives.		
29g	Treated materials or substances	.66
28g	Materials/substances modified by miscellaneous mechanical actions, excluding material removal and forming	.59
38g	Written communications pertaining to material/object modification, assembly, or fabrication	.32
6g	Satisfactory output from mechanical devices	.30
5g	Mechanical devices installed or assembled	-.30
24g	Installed or attached objects	-.34
Dimension F-9: Objectives pertaining to water conditions.		
50g	Maintenance of satisfactory water conditions and/or detection of unsatisfactory water conditions	.90
54g	Written communications pertaining to water, atmospheric, or astronomical conditions or events	.90
Dimension F-10: Business/sales objectives.		
57g	Aesthetically arranged objects or things	-.30
100g	Improved state of grooming or appearance of people	-.34
83g	Numerical information orally communicated	-.41
103g	Attitude, opinion, or belief change in others	-.46
91g	Advertising material produced, displayed, or disseminated	-.52
89g	Completed sales or business/organizational transactions	-.59

Table 8 (continued)

	Work Dimension	Rotated Loading[a]
Dimension F-10: (continued)		
107g	Enjoyment, satisfaction, or mood change of others	-.62
93g	Public relations accomplishments	-.65
Dimension F-11: Clerical objectives.		
78g	Verbal material transcribed	.70
75g	Written material edited or checked for composition and format	.66
76g	Written material categorized	.56
85g	Information encoded into written symbols or codes	.54
87g	Reproduced semantic/symbolic material	.52
74g	Written material reviewed or edited for content	.50
88g	Semantic/symbolic material verified	.47
72g	Routine written output	.33
Dimension F-12: Material modification objectives.		
27g	Finished or prepared surfaces	.67
22g	Completed structures and other constructed objects	.63
25g	Shaped objects	.60
26g	Formed objects	.33
Dimension F-13: Organizational objectives.		
97g	Organizational plans or innovations	.85
95g	Satisfactory index of organizational performance attained	.73
96g	Business/organizational data gathered, compiled, or displayed	.72

Table 8 (continued)

	Work Dimension	Rotated Loading[a]
Dimension F-13:	(continued)	
99g	Written business/organizational communication	.70
92g	Employee relations accomplishments	.65
104g	Others' compliance with directions, rules, or laws insured or monitored	.37
94g	Balanced, verified, or updated business/organizational records	.34
91g	Advertising material produced, displayed, or disseminated	.32
93g	Public relations accomplishments	.30
Dimension F-14:	Objectives pertaining to electrical/electronic plans, innovations, and written communications.	
20g	Electrical/electronic innovations or plans	.51
21g	Written communication of electrical/electronic information	.49
73g	Non-standard or innovative written output	.46
80g	Solutions to advanced mathematical problems	.36
74g	Written material reviewed or edited for content	.35
Dimension F-15:	Objectives pertaining to terrain or earth features.	
46g	Terrain or earth features modified	.67
8g	People, objects, or materials transported	.56
Dimension F-16:	Assembly and fabrication objectives.	
31g	Satisfactory condition of assembled or fabricated objects, excluding mechanical and electrical/electronic devices	.80
23g	Assembled or fabricated objects	.68

[a] Rotated loadings less than .29 were omitted.

electrical/electronic information, and electrical/electronic innovation or plans. Jobs receiving high scores on this factor include: bio-instrumentation technician, electrical assemblies foreman, senior communications electrician, substation operator, electrician "A," electrical aircraft mechanic, electrical-appliance serviceman, electronics mechanic, electronics assembler, nuclear engineer, and electronic technician.

Dimension F-3: Graphic/semantic technical objectives. This dimension emphasizes the production of technical information in written, graphic, and symbolic form. The inclusion in this factor of three items concerning innovations and plans and three items dealing with written communications suggests a class of work goals requiring creativity and abstract thinking. This interpretation is supported by the type of jobs receiving high factor scores--e.g., nuclear engineer, thermodynamics engineer, tool designer, production engineer, furniture designer, maintainability design engineer, cost analysis engineer, cloth designer, and mechanical draftsman.

Dimension F-4: Mechanical objectives. All of the items loading on this dimension are concerned with the accomplishment of objectives requiring physical contact with mechanical devices. The concern is with objectives related to the maintenance and restoration of proper mechanical functioning and, to a lesser extent, with the installation, regulation and control of mechanical devices. Examples of jobs receiving high scores on this dimension include: aircraft and engine mechanic, electrical-appliance serviceman, packaging-machine mechanic, building maintenance man, gas-appliance serviceman, automobile-service-station mechanic, boat mechanic, powder-line repairman, and sewing machine repairman.

Dimension F-5: Objectives related to the behavior of others. This dimension emphasizes a variety of work objectives pertaining to the modification, control, and evaluation of the behavior of others. Examples of jobs that received high scores on this factor include: occupational therapist, credit manager, rehabilitation counselor, general foreman, psychiatrist, psychiatric technician, secondary school teacher, case worker, and physical therapist.

Dimension F-6: Spatial arrangement objectives. This dimension emphasizes objectives pertaining to the spatial arrangement of objects and materials, with some suggestion of aesthetic concern. Jobs receiving high factor scores include: retail store manager, leather products salesman (wholesale trade), advertising production manager, job compositor, display man, silver saleslady, stock supervisor, automat-car attendant (railroad transportation), illustrator, sporting goods salesman (retail trade; wholesale trade), and bartender.

Dimension F-7: Health objectives. The work elements loading substantially on this dimension deal with problems of health and related objectives concerning the physical condition of people. The jobs with the highest factor scores are licensed practical nurse,

nurse aide, dentist, psychiatric aide, dental hygienist, psychiatrist, medical technologist, general duty nurse, and physical therapist.

Dimension F-8: Material/substance treatment objectives. This dimension emphasizes work goals related to the treatment of materials or substances. Such treatment might involve chemicals, heat, and mechanical agitation. The significant negative loadings on Items 5g and 24g did not seem to warrant a bipolar interpretation of this factor. Jobs receiving high positive scores on this dimension include: polymerization foreman, plate manufacturing foreman, baker, extractor operator (solvent process), feed mill chief, banbury-mixer operator, cloth finisher (textile), and chemical operator III.

Dimension F-9: Objectives pertaining to water conditions. This dimension is defined by work elements concerned with objectives involving (a) the maintenance of satisfactory water conditions and/or detection of unsatisfactory water conditions; and (b) written communications pertaining to water, atmospheric, or astronomical conditions or events. It should be noted that these two work elements are probably the only items in the Work Goals section of the OAI that could meaningfully characterize this dimension (since Item 53g--Innovations or plans concerning water, atmospheric, or astronomical conditions or events--was not included in the factor analysis). Examples of jobs that received high scores on this factor include: hydrologist, microbiologist, chemical engineer, laboratory tester I, fish and game warden, ice maker, forester aide, stationary engineer, farm foreman, water-treatment plant operator, lifeguard, and fishing vessel captain.

Dimension F-10: Business/sales objectives. The work elements loading substantially on this dimension define a variety of objectives related to the sales aspect of business. These elements deal with goals such as selling, public relations, and advertising. Also included are items concerning the effect of such activities upon people (i.e., enjoyment; satisfaction; and change in mood, attitude, opinion, or belief). The jobs receiving high scores on this dimension were predominantly in the sales field, thus reinforcing this interpretation.

Dimension F-11: Clerical objectives. This dimension emphasizes objectives typically associated with clerical work. These objectives include such elements as transcribing, editing/checking, categorizing, encoding, and reproducing. This interpretation is further supported by the types of jobs that received high factor scores. These jobs included: stenographer, wires-transfer clerk, medical secretary, correspondence clerk, chief time keeper, head teller, checker I, transcribing-machine operator, secretary, and job analyst.

Dimension F-12: Material modification objectives. The work elements characterizing this dimension concern objectives pertaining to the modification of objects/materials by surface finishing, construction, material removal (e.g., cutting, chipping, shearing, grinding, and drilling), and material forming. The inclusion of shaping and forming and the exclusion of chemical, electrical, and other types of treatment distinguish Dimension F-12 from F-8 (Material/substance treatment objectives). Thus, the two dimensions tend to complement each other and, together, account for all of the OAI material-modification objectives. Jobs receiving high scores on this dimension include: dentist, shipfitter, cabinet maker, ludlow-machine operator, spar mechanic, carpenter helper, metal fabricator I, maintenance carpenter, plaster patternmaker, carpenter (construction), pipe-making welder, and injection-molding-machine tender.

Dimension F-13: Organizational objectives. This dimension emphasizes a number of business/organizational objectives typically associated with administrative, managerial, and staff positions. These objectives include planning, innovation, satisfactory organizational performance, business/organizational data gathering, written business/organizational communication, and employee and public relations accomplishments. Some of the jobs receiving high scores on this dimension were: social welfare administrator (YMCA), executive vice president of the chamber of commerce, corporation president, area development manager, recreation supervisor (hotel), personnel services coordinator, market-research analyst I, administrative assistant, store manager, and city circulation manager.

Dimension F-14: Objectives pertaining to electrical/electronic plans, innovations, and written communications. The title of this dimension derives from the two highest loading items: Electrical/electronic innovations or plans (20g) and written communication of electrical/electronic information (21g). The remaining items (73g, 74g, and 80g) complement this interpretation. Jobs with high factor scores include: bio-instrumentation technician, cost analysis engineer, tests superintendent (light, heat, and power), public utilities salesman, market-research analyst I, field engineer (electronics), nuclear engineer, electronic engineer, factory maintenance man, chief meter reader, maintainability design engineer, production engineer, and electronic technician.

Dimension F-15: Objectives pertaining to terrain and earth features. Although only two items load substantially on this factor, the nature of these items in combination with the jobs receiving high factor scores seemed to justify its interpretation. The dimension appears to involve both the modification of earth/terrain features and the transportation of earth related products, such as crops and timber. Among the jobs with high factor scores were: operating engineer II (construction), logging manager, power-shovel operator, farm foreman, jackhammer operator (construction), forester, rose grower, farm hand, berry grower, forester aide, dairy farmer, and log stacker. These jobs fall into three groups: construction, farming, and timber (forestry and logging).

Dimension F-16: Assembly and fabrication objectives. The two elements loading on this factor pertain to assembled or fabricated objects and the satisfactory condition of such objects. Examples of jobs receiving high scores on this factor include: quality control

director, electrical assemblies foreman, seamstress, electronics assembler, production department foreman (aerospace), module assembler, bag machine operator, warehouse manager, gluer II, electric-motor assembler, hosiery mender, clothes designer, ludlow-machine operator (printing & publishing).

Dimensions of Work Context

The factor analysis of the work elements comprising the Work Context section of the OAI yielded 13 dimensions which accounted for 63 percent of the total variance. All of these dimensions were interpreted and are presented in Table 9.

Dimension G-1: Responsibility. The first dimension emerging from the analysis emphasizes working conditions in which the incumbent has a considerable amount of responsibility. The significant loading on Item 25c (Business attire) suggests white-collar work situations. Among those jobs receiving high scores on this dimension are nuclear engineer, hydrologist, bio-instrumentation technician, tests superintendent, public utilities commissioner, osteopath, thermodynamics engineer, airplane captain, and corporation president.

Dimension G-2: Mechanical hazards. This dimension is characterized by work elements pertaining to situations in which the incumbent is directly exposed to mechanical hazards and various related elements such as noise, vibration, moving or falling objects, and toxic conditions. Some of the jobs that received high scores on this factor include: thimble press operator (ore refining), farmer, factory maintenance man helper, log stacker operator (sawmill), floor and bench molder (foundry), sand-slinger operator (foundry), rotary-driller helper, metal fabricator, and boilermaker.

Dimension G-3: Steady versus irregular work. This dimension is clearly bipolar in structure. Item 32c (Steady work) has a high positive loading, contrasted with the substantial negative loadings on Items 34c (Irregular work) and 33c (Seasonal work). The substantial negative loadings on Items 37c (Variable hours) and 1c (Time spent inside/outside) support this interpretation. Examples of jobs receiving high positive factor scores include: light cleaner, foundrineer-machine tender, public utilities commissioner, shipfitter, sorter (brick & tile), extractor operator, plasterer, and forester. Jobs with high negative factor scores include: fishing vessel captain, press box custodian (amusement & recreation), receiving barn custodian (amusement & recreation), farm foreman, survey worker, fisherman (purse seine), and cash grain farmer.

Dimension G-4: Job structure. This dimension emphasizes structured working conditions in which the goals, procedures, standards, timing, etc., are restricted or prescribed by the nature of the job. The significant negative loading on Item 31c (Task diversity) is consistent with this analysis and does not seem to warrant a bipolar

Table 9. Dimensions of Work Context

	Work Dimension	Rotated Loading^a
Dimension G-1:	Responsibility.	
47c	Financial or material consequences of errors	.77
46c	Updating knowledge, techniques, and skills	.75
50c	Organizational responsibility	.69
49c	Intangible consequences of errors	.65
31c	Task diversity	.56
25c	Business attire	.35
41c	Distractions or interruptions	.32
48c	Safety consequences of errors	.31
45c	Time away from home	.30
Dimension G-2:	Mechanical hazards.	
13c	Mechanical hazards	.73
8c	Noise intensity	.60
20c	Overall hazard of the job	.54
22c	Work clothes	.54
4c	Dirty environment	.47
48c	Safety consequences of errors	.46
21c	Safety apparel	.44
18c	Toxic conditions	.41
6c	Vibration	.37
14c	Moving or falling objects	.33
25c	Business attire	-.31
Dimension G-3:	Steady versus irregular work.	
32c	Steady work	.88
1c	Time spent inside/outside	-.38
37c	Variable hours	-.68

Table 9 (continued)

	Work Dimension	Rotated Loading[a]
Dimension G-3:	(continued)	
33c	Seasonal work	-.73
34c	Irregular work	-.74
Dimension G-4:	Job structure.	
29c	Performance standards	.83
27c	Timing and sequence	.79
26c	Work procedures	.78
30c	Goals	.74
43c	Confinement to a specified work space	.54
52c	Working individually in the presence of co-workers or others where social interaction is possible	.40
31c	Task diversity	-.38
Dimension G-5:	Low or fluctuating temperature conditions.	
11c	Low temperature	.86
12c	Sudden temperature changes	.72
Dimension G-6:	Uniformed shift work.	
36c	Changing shift work	.68
24c	Uniform	.60
41c	Distractions or interruptions	.37
53c	Working jointly with others as part of a team where social interaction and cooperation are necessary	.37
54c	Working individually in a one-to-one relationship with a customer, client, student, etc., where social interaction is restricted primarily to that person	.30

Table 9 (continued)

	Work Dimension	Rotated Loading[a]
Dimension G-7: Unpleasant or trying interpersonal situations.		
41c	Distractions or interruptions	-.30
54c	Working individually in a one-to-one relationship with a customer, client, student, etc., where social interaction is restricted primarily to that person	-.32
59c	Civic obligations	-.44
58c	Unpleasant social relationships	-.85
57c	Interpersonal conflict	-.91
Dimension G-8: Wet or humid working conditions.		
3c	Humid	.83
2c	Wet	.77
Dimension G-9: Unpleasant/hazardous outdoor working conditions.		
15c	High places	.74
9c	Unpleasant weather conditions	.64
14c	Moving or falling objects	.61
1c	Time spent inside/outside	.56
6c	Vibration	.30
17c	Electrical hazards	.30
Dimension G-10: High temperature conditions.		
16c	Exposure to burns	.81
10c	High temperature	.72
17c	Electrical hazards	.46
12c	Sudden temperature changes	.37

Table 9 (continued)

	Work Dimension	Rotated Loading[a]
Dimension G-11:	Working alone versus working in the presence of others.	
51c	Working alone with little or no opportunity for social interaction	.83
18c	Toxic conditions	.30
52c	Working individually in the presence of co-workers or others where social interaction is possible	-.57
Dimension G-12:	Hazardous blue-collar versus white-collar work.	
19c	Other hazards	.65
48c	Safety consequences of errors	.48
24c	Uniform	.43
25c	Business attire	-.34
59c	Civic obligations	-.34
Dimensions G-13:	Cooperative versus individual work situations.	
53c	Working jointly with others as part of a team where social interaction and cooperation are necessary	.56
22c	Work clothes	.33
54c	Working individually in a one-to-one relationship with a customer, client, student, etc., where social interaction is restricted primarily to that person	-.32
52c	Working individually in the presence of co-workers or others where social interaction is possible	-.33
25c	Business attire	-.39

[a] Rotated loadings less than .29 were omitted.

interpretation. Some of the jobs that received high positive scores on this dimension are: pilar (foundry), instrument adjuster, folding-machine operator, log stacker operator, battery assembler, creeler, and twitchell operator.

Dimension G-5: Low or fluctuating temperature conditions. The two elements defining this dimension deal with situations in which the worker is exposed to cold temperatures and to sudden temperature changes. Some of the jobs receiving high scores on this factor were: meat cutter, first helper on electric furnace, chipping machine operator (slaughtering and meat packing), laborer (slaughtering and meat packing), polymerization foreman, scale mechanic, material handler, and dietitian.

Dimension G-6: Uniformed shift work. The items loading on this dimension describe a work situation in which the incumbent wears a uniform, works varying shifts, and interacts either with co-workers or members of the public. Jobs receiving high scores on this dimension include: passenger car conductor (railroad transportation), telegrapher (railroad transportation), surgical technician, fountain girl, bartender, baggageman, airplane stewardess, cargo agent (air transportation), ticket agent, and airplane captain.

Dimension G-7: Unpleasant or trying interpersonal situations. The items defining this dimension pertain to interaction between the incumbent and other individuals under unpleasant or trying circumstances. Included among these items are interpersonal conflict, unpleasant social relationships, civic obligations, and distractions or interruptions. Examples of jobs receiving high scores on this factor include: embalmer, claims adjuster, farm foreman, branch bank manager, credit manager, recreation director, accounting manager (insurance), and cost analysis engineer.

Dimension G-8: Wet or humid working conditions. This dimension emphasizes working conditions in which the incumbent is exposed to an excessive amount of moisture or humidity. Jobs receiving high scores on this dimension include: wet wash assembler (laundry), ice maker, dairy processing equipment operator, foundrinier machine tender (paper and pulp), twitchell operator (chemical), cloth finisher (textile), pipe fitter (maintenance), and fishing vessel captain.

Dimension G-9: Unpleasant/hazardous outdoor working conditions. This dimension emphasizes outdoor working situations (see Item 1c) in which the incumbent is exposed to a variety of unpleasant and hazardous conditions. Examples of jobs receiving high scores on this factor include: power-shovel operator, jackhammer operator, switchman (railroad transportation), fire fighter, lineman, shipfitter, arc welder, gasoline truck operator, and rotary-driller helper.

Dimension G-10: High temperature conditions. The elements marking this dimension deal with conditions in which the incumbent is exposed to high temperatures and danger of burns, as well as electrical hazards and sudden temperature changes. An examination of the factor scores for jobs further clarifies this dimension. Among the jobs with high factor scores were: furnace operator, first helper on electric furnace, kiln burner, chef, weld-pipe mill inspector, fire fighter, arc welder, and baker.

Dimension G-11: Working alone versus working in the presence of others. This bipolar dimension emphasizes situations in which the incumbent works alone, contrasted with working in the presence of others. The small but significant positive loading on Toxic conditions (18c) is reflected in several jobs receiving high positive factor scores. Among these jobs were: pilar (foundry), pilot-control operator (chemistry; plastic material), feeder (agriculture), warehouseman, farmer, newspaper photographer, offset-duplicating machine operator, and animal caretaker. Jobs with high negative scores included: production department foreman (aerospace), foreman (mort. goods), spar mechanic, senior communications electrician, telephone-answering-service operator, and porter I.

Dimension G-12: Hazardous blue-collar versus white-collar work. This factor contrasts work situations involving miscellaneous hazards with managerial and professional work situations. Jobs receiving high positive factor scores include: dope-dry-house operator (explosives), powder-line repairman, fishing vessel captain, dynamite-cartridge crimper, patrolman, and psychiatric aide. Among the jobs receiving high negative scores (reflecting the white-collar aspect) were: corporation president, columnist, cost analysis engineer, recreation director, personal service representative (telephone and telegraph), accounting manager, and securities trader.

Dimension G-13: Cooperative versus individual work situations. The interpretation of this bipolar factor is not entirely clear. The positive pole emphasizes blue-collar situations requiring teamwork or cooperation among workers, as contrasted with the negative pole which emphasizes individual work situations. Although Business attire (Item 25c) has a significant negative loading, some of the jobs with substantial negative factor scores (e.g., jackhammer operator) require work clothes. Examples of jobs receiving high positive scores on this dimension include: electrician helper, coverer helper (sports equipment), receiving clerk, cattle rancher, harvest hand, trimmer (knit goods), and hay stacker. Jobs receiving high negative factor scores include: automobile parts salesman, exterminator, sporting goods salesman, order clerk, log stacker operator, pilar, jackhammer operator, and thimble press operator.

"Higher-Order" Factor Analysis

A principal components analysis of the intercorrelations among the 90 first-order factors (based on the data from the combined job sample) yielded a total of 22 higher-order factors accounting for 67 percent of the total variance. These higher-order factors are presented in Table 10. Only those first-order factors having substantial

Table 10. Higher-Order Work Dimensions

	Work Dimension	Rotated Loading[a]
Dimension H-1:	Business/organizational activities.	
F-13	Organizational objectives	.85
A-2	Indirect business/sales information	.75
E-1	Supervisory activities	.59
B-7	Work-related preparation and experience	.42
G-1	Responsibility	.41
B-1	Semantic planning and problem solving	.32[b]
E-3	Consultation activities	.31
D-6	Unnamed (Signals by visual means)	-.30
Dimension H-2:	Electrical/electronic activities.	
F-2	Electrical/electronic objectives	.92
A-1	Electrical/electronic information	.88
C-3	Electrical and mechanical repair and maintenance	.67
C-11	Precision assembling	.43[c]
G-10	High temperature conditions	.40
Dimension H-3:	Mechanized equipment operation.	
F-15	Objectives pertaining to terrain or earth features	.72
C-18	Heavy equipment operation	.59
G-9	Unpleasant/hazardous outdoor working conditions	.53
C-15	Agricultural activities	.47
A-3	Environmental information	.35
G-3	Steady versus irregular work	-.60[b]
Dimension H-4:	Art/decorative activities.	
C-6	Stationary material-removing machine operation	.37
B-5	Figural creativity	-.53

Table 10 (continued)

Work Dimension		Rotated Loading[a]
Dimension H-4: (continued)		
F-6	Spatial arrangement objectives	-.67
A-14	Art/decorative information	-.74
Dimension H-5: Medical/health related activities.		
G-6	Uniformed shift work	-.29
E-3	Consultation activities	-.30
E-8	Assisting superiors	-.41
G-12	Hazardous blue-collar versus white-collar work	-.45[b]
C-7	Activities involving physical contact with people or animals	-.76
A-6	Direct health information	-.87
F-7	Health objectives	-.87[c]
Dimension H-6: Sales/customer service activities.		
F-10	Business/sales objectives	.84[c]
A-13	Direct sales information	.81
E-6	Selling	.71
E-2	Customer service activities	.59
G-7	Unpleasant or trying interpersonal situations	.52[c]
D-1	Verbal communication	.33
B-4	Behavioral information processing	.31
E-7	White-collar personal service activities	.29
G-13	Cooperative versus individual work situations	-.32[b]
Dimension H-7: Chemically treating materials/substances.		
F-8	Material/substance treatment objectives	.75[b]
C-4	Combining/separating processed substances and materials	.65

Table 10 (continued)

Work Dimension		Rotated Loading[a]
Dimension H-7: (continued)		
C-20	Activities related to heat and chemical treatment	.56
G-8	Wet or humid working conditions	.47
A-7	Information concerning the chemical properties of materials	.39
G-10	High temperature conditions	.34
Dimension H-8: Verbal versus routine numerical activities.		
A-15	Information pertaining to food preparation and service	.46[b]
B-8	Semantic facility and productivity	.46
D-7	Unnamed (Audio-visual transmission and storage devices)	.30
B-6	Routine semantic/symbolic activities	-.29
A-12	Numerical/graphic information	-.56
D-2	Numerical/clerical activities	-.66
F-1	Bookkeeping objectives	-.79
Dimension H-9: Clerical activities.		
G-13	Cooperative versus individual work situations	.32[b]
D-7	Unnamed (Audio-visual transmission and storage devices)	-.29
D-2	Numerical/clerical activities	-.34
B-6	Routine semantic/symbolic activities	-.66
D-4	Use of office equipment	-.75
A-10	Clerical information	-.76
F-11	Clerical objectives	-.90

Table 10 (continued)

	Work Dimension	Rotated Loading[a]
Dimension H-10:	Constructing/fabricating.	
F-12	Material modification objectives	.78
C-14	Construction and woodworking activities	.73
A-11	Spatial/structural information	.43
C-10	Preparation/modification of surfaces	.40
C-6	Stationary material-removing machine operation	.32
Dimension H-11:	Material joining/assembling.	
F-16	Assembly or fabrication objectives	.74
C-19	Pressing rubber, plastic, and related synthetic materials	.44[b]
G-4	Job structure	.39[b]
C-9	Precision work involving small or fragile objects and materials	.37[b]
E-4	Subordinate activities	.33
C-8	Sewing, stitching, and related activities	.32
A-11	Spatial/structural information	.30
Dimension H-12:	Mechanical activities.	
C-17	Liquid application/coating	-.29
C-6	Stationary material-removing machine operation	-.34
C-2	Machine control operations	-.41
G-2	Mechanical hazards	-.42[b]
C-3	Electrical and mechanical repair and maintenance	-.56
A-5	Mechanical information	-.88
F-4	Mechanical objectives	-.91
Dimension H-13:	Technical planning and communication.	
B-8	Semantic facility and productivity	-.31
B-3	Symbolic thinking and problem solving	-.35

Table 10 (continued)

	Work Dimension	Rotated Loading[a]
Dimension H-13: (continued)		
A-7	Information concerning the chemical properties of materials	-.37
D-5	Technical/symbolic information processing and communication	-.37[c]
C-16	Measuring/testing	-.38
F-14	Objectives pertaining to electrical/electronic plans, innovations, and written communications	-.87
Dimension H-14: Instructing and advising.		
F-5	Objectives related to the behavior of others	.89[c]
E-5	Teaching/instructing	.73
A-9	Information pertaining to human behavior and characteristics	.70
E-7	White-collar personal service activities	.46
B-4	Behavioral information processing	.40
D-1	Verbal communication	.36
B-8	Semantic facility and productivity	.35
E-1	Supervisory activities	.34
G-7	Unpleasant or trying interpersonal relations	.34[c]
D-7	Unnamed (Audio-visual transmission and storage devices)	.31
Dimension H-15: Activities involving body coordination/orientation.		
C-5	Physical coordination	.67[b]
B-9	Spatial information processing	.66
B-1	Semantic planning and problem solving	.36[b]
G-4	Job structure	.32[b]
E-7	White-collar personal service activities	.29
C-19	Pressing rubber, plastic, and related synthetic materials	-.30[b]

Table 10 (continued)

Work Dimension		Rotated Loading[a]
Dimension H-16: Figural arrangement and problem solving versus assisting superiors.		
B-2	Figural perception and problem solving	.56
A-17	Information pertaining to physical arrangement and layout	.33
B-7	Work-related preparation and experience	.29
C-17	Liquid application/coating	-.32
E-4	Subordinate activities	-.32
E-8	Assisting superiors	-.36
Dimension H-17: Technical drawing and innovation.		
B-5	Figural creativity	-.32
A-17	Information pertaining to physical arrangement and layout	-.39
B-3	Symbolic thinking and problem solving	-.39
A-4	Written technical information	-.76[b]
D-3	Technical drawing	-.76
F-3	Graphic/semantic technical objectives	-.84
Dimension H-18: Environmentally related activities.		
A-3	Environmental information	.78
F-9	Objectives pertaining to water conditions	.74
C-15	Agricultural activities	.45[c]
Dimension H-19: Physical activities associated with unpleasant temperature conditions.		
G-5	Low or fluctuating temperature conditions	.61
C-1	General physical versus sedentary activities	.53[b]
F-6	Spatial arrangement objectives	.32
G-10	High temperature conditions	.29

Table 10 (continued)

	Work Dimension	Rotated Loading[a]
Dimension H-20: Use of topographical information.		
D-6	Unnamed (Signals by visual means)	-.36
G-13	Cooperative versus individual work activities	-.43[b]
G-6	Uniformed shift work	-.51
A-16	Topographical information	-.68
Dimension H-21: Cutting/separating versus joining/assembling.		
C-12	Cutting/processing food materials	.62
C-9	Precision handling/inspecting fabricated products	.32[b]
C-11	Precision assembling	-.35[c]
Dimension H-22: Material forming and modification.		
C-13	Material forming	.68
A-8	Information concerning the physical characteristics of materials	.61
C-10	Preparation/modification of surfaces	.36
F-12	Material modification objectives	.32

[a] Rotated loadings less than .29 were omitted.

[b] This is a bipolar first-order factor.

[c] The sign of this loading has been reversed. Since all significant loadings on the first-order factor were negative, the sign of its loading on the higher-order factor was reversed to allow for correct interpretation.

rotated loadings (.29 or above) were included in this table. The intercorrelation matrix for the 22 higher-order factors is shown in Appendix F. In the paragraphs which follow, each of these dimensions is briefly described in terms of its first-order factor composition. Examples of jobs receiving high scores on each dimension are also provided in order to facilitate the interpretations.

Dimension H-1: Business/organizational activities. The first factor to emerge from the higher-order analysis involves activities pertaining to business/organizational matters. The emphasis on supervision, responsibility, and to a lesser degree, planning and problem solving suggest administrative or executive duties. This interpretation is consistent with the jobs receiving high scores on this dimension. Among these were: corporation president, executive vice-president of the chamber of commerce, social welfare administrator, sales manager, personnel services coordinator, insurance manager, advertising manager, branch bank manager, technical reporting analyst, controller, and market-research analyst.

Dimension H-2: Electrical/electronic activities. This dimension is characterized by information, activities, and goals pertaining to electrical/electronic devices and processes. Examples of jobs receiving high scores on this factor include: electrician, electronic assemblies foreman, electrical aircraft mechanic, factory maintenance man, electronic technician, electrical-appliance serviceman, electrician helper, electronics assembler, senior communications electrician, and nuclear engineer.

Dimension H-3: Mechanized equipment operation. The factors loading substantially on this dimension emphasize mechanized equipment operation in connection with earth working, agricultural, and other environmentally related activities. Jobs receiving high scores on this dimension include: power-shovel operator, log stacker operator, logging manager, operating engineer II (construction), jackhammer operator, farm foreman, rose grower, berry grower, forester, and scraper operator.

Dimension H-4: Art/decorative activities. This dimension emphasizes activities of an aesthetic nature. Examples of jobs receiving high factor scores include: furniture designer, clothes designer, art teacher, illustrator, display man, stripper (printing and publishing), artist, advertising production manager, newspaper photographer, and silver saleslady.

Dimension H-5: Medical/health related activities. The pattern of loadings on this factor defines a dimension of medical and other health related activities. Jobs receiving high scores on this dimension include: physician, osteopath, veterinarian, dentist, licensed practical nurse, nurse aide, psychiatric aide, physical therapist, head animal keeper, dental hygientist, and medical technologist.

Dimension H-6: Sales/customer service. The first-order factors comprising this dimension clearly indicate an involvement with sales and customer service. This interpretation is consistent with the kind of jobs receiving high factor scores. These jobs include: catering manager, gemologist, home-service representative, recreation director, wine steward, hotel clerk, bartender, and various sales positions.

Dimension H-7: Chemically treating materials/substances. This dimension emphasizes chemical processing and the chemical treatment of materials and substances. Examples of jobs receiving high scores on

factor include: twitchell operator (chemistry), baker, pulp bleacher man, chemical operator III, plater (pen & pencil), polymerization foreman, pilot-control operator (chemistry; plastic material), extractor operator (solvent process), silver stripper (mirror), and treating engineer (wood preserving).

Dimension H-8: Verbal versus routine numerical activities. The interpretation of this bipolar factor is not entirely clear. The positive pole of the factor seems to emphasize verbal facility while the negative pole is concerned primarily with numerical activities. This dichotomy is also reflected in the jobs that received high scores on the dimension. Among the jobs receiving high positive scores were: columnist, hotel recreation director, executive vice president of the chamber of commerce, sociologist, and literary writer. Jobs receiving high negative scores include: wires-transfer clerk (banking), billing-control clerk, accountant, bookkeeper, and head teller.

Dimension H-9: Clerical activities. The clerical nature of this dimension is clearly revealed both by the first-order factors having substantial loadings and by the jobs receiving high factor scores. Among these jobs were: correspondence clerk, stenographer, medical secretary, transcribing-machine operator, columnist, telephone-answering-service operator, chief time keeper, wires-transfer clerk, tabulating-machine operator, and office secretary.

Dimension H-10: Constructing/fabricating. This dimension emphasizes a range of activities concerned with construction and fabrication, as well as the maintenance and modification of structures and other objects. Examples of jobs receiving high scores on this dimension include: carpenter (construction), shipfitter, maintenance carpenter, carpenter helper, spar mechanic, model maker, bricklayer helper, cabinet maker, metal fabricator, and plaster patternmaker (aircraft manufacturing).

Dimension H-11: Material joining/assembling. The factors comprising this dimension deal with various aspects of material joining or assembling. Jobs receiving high factor scores include: seamstress, electrical assembler, case coverer (jewelry; leather products), module assembler (electronics), gluer II, emergency equipment repairman, quality control director, electrical assemblies foreman, flexographic pressman, and garment patternmaker.

Dimension H-12: Mechanical activities. This dimension emphasizes activities pertaining to the maintenance, repair, and operation of machines. Examples of jobs receiving high scores on this dimension include: automobile mechanic, boat mechanic, horizontal boring-mill set-up operator, web-press man, punch-press operator, aircraft-and-engine mechanic, powder-line repairman, diesel mechanic, printer-slotter operator, and packaging-machine mechanic.

Dimension H-13: Technical planning and communication. One first-order factor, Dimension F-14 (Objectives pertaining to electrical/electronic plans, innovations, and written communications), clearly predominates in this work dimension. The other five factors with significant loadings, while supporting the emphasis of F-14 tend to broaden the scope of this technically oriented dimension. The jobs receiving high factor scores include: bio-instrumentation technician, tests superintendent, cost analysis engineer, nuclear engineer, area development manager, thermodynamics engineer, public utilities salesman, and chemical engineer.

Dimension H-14: Instructing and advising. The factors comprising this dimension seem to pertain to the various aspects of teaching, instructing, and advising. Jobs receiving high scores on this dimension include: elementary and secondary school teachers, college faculty member, occupational therapist, athletic coach, rehabilitation counselor, personal service representative (telephone and telegraph), case worker, bridge instructor, credit manager, music teacher, and psychiatrist.

Dimension H-15: Body coordination/orientation. This dimension deals primarily with activities involving physical coordination and spatial orientation. Examples of jobs receiving high factor scores include: knitting-machine operator, weaver, arc welder, routeman, harvest hand, claims adjuster, shipfitter, burgler, carpenter, vegetable grower, and fishing vessel captain.

Dimension H-16: Figural arrangement and problem solving versus assisting superiors. This dimension has a bipolar structure. The first-order factors having significant positive loadings deal with information and activities pertaining to figural perception, arrangement, and problem-solving; the negatively loading factors emphasize providing assistance to superiors. Examples of jobs receiving high positive factor scores include: ludlow-machine operator, metal fabricator, fishing vessel captain, cabinet maker, biologist, head butcher, machinist I, air-traffic-control specialist, veterinarian, survey worker, and plaster pattern maker. Jobs receiving high negative scores on this factor include: bio-instrumentation technician, first helper on an electric furnace, electrician helper, inhalation therapist, coverer helper (sports equip.), checker I, and occupational therapy aide.

Dimension H-17: Technical drawing and innovation. The factors characterizing this dimension deal with activities of a technical, symbolic nature. The two highest loading factors stress technical drawing and innovation, and the remaining factors support this interpretation. Among the jobs with high scores on this dimension are: nuclear engineer, tool designer, maintainability design engineer, thermodynamics engineer, furniture designer, production engineer, cloth designer, mechanical draftsman, building designer, and detail draftsman.

Dimension H-18: Environmentally related activities. This dimension emphasizes activities pertaining to the outdoor environment, especially those related to water conditions and agriculture. Examples of jobs receiving high scores on this factor include: hydrologist, farm foreman, chemical engineer, forester aide, microbiologist, fish and game warden, vegetable grower, fishing vessel captain, grass farmer, berry grower, rose grower, and general farmer.

Dimension H-19: Physical activities associated with unpleasant temperature conditions. This dimension emphasizes a number of physical work activities associated with situations in which the incumbent is exposed to extreme temperatures (hot or cold) and sudden temperature changes. An examination of the jobs that received high factor scores helps clarify this interpretation. Included among these jobs are: bakery laborer, arc welder, dietitian, first helper on an electric furnace, meat cutter (slaughtering and meat packing), fire fighter, shipfitter, chef, laborer (slaughtering and meat packing), cafeteria manager, and short-order cook.

Dimension H-20: Use of topographical information. The first-order factor with the highest loading on this dimension emphasizes information from maps and charts pertaining to geographical or topographical layout. Other factors marking this dimension emphasize cooperative work activities and uniformed shift work. Jobs receiving high scores on this factor include: bio-instrumentation technician, airplane captain, survey worker, general farmer, air-traffic-control specialist, fishing vessel captain, passenger car conductor, columnist, cargo agent, and athletic coach.

Dimension H-21: Cutting/separating versus joining/assembling. The interpretation of this bipolar dimension is unclear. The factor with the highest positive loading involves cutting food materials, whereas the one factor with a negative loading involves precision assembling. The factor scores for jobs are in general agreement with the first-order factors marking the poles of this dimension. Thus, jobs with high positive factor scores include: meat cutter, chef, head butcher, and dietitian. Among the jobs with high negative factor scores were: furniture upholsterer, engine assembler, boilermaker I, arc welder, diesel mechanic, and boat mechanic.

Dimension H-22: Material forming and modification. The factors characterizing this dimension deal with material modification, particularly material forming (i.e., shaping materials through utilization of their plastic or molten properties or their reaction to pressure). Examples of jobs receiving high scores on this dimension include: forming-machine operator (glass manufacturing), ludlow-machine operator (printing and publishing), compression-molding machine tender, die-casting machine operator, ring stamper, metallurgical technician, pipe-making welder, arc welder, dentist, art teacher, and floor and bench molder.

DISCUSSION

The present study was a follow-up of a previous investigation in which factors were derived from the OAI ratings of a representative sample of 400 jobs (Riccobono and Cunningham, 1971). The first objective of this study was to determine the stability of the originally derived factor structure through a replication of the original factor analyses with a new sample of 400 jobs. The second and third objectives involved the derivation of first- and higher-order factors, respectively, from the OAI ratings of a combined sample of 814 jobs.

The results of the analyses of factorial stability are summarized in Table 2 (p. 8), which contains a frequency distribution of the highest congruence coefficients for the factors from the replication sample when compared with the factors from the original sample. As noted by Pinneau and Newhouse (1964), there is no test of significance for the coefficient of congruence, and its interpretation is somewhat ambiguous. The major difficulty with this index is that of establishing a minimum value for factor similarity. Tucker (1951) has described a congruence coefficient of .9398 as "moderately high," and coefficients of .9997 and above as "high." As noted by Struening and Cohen (1963), however, ". . . the variables in Tucker's study were tests or item composites rather than single . . . items with known high errors of measurement." Accordingly, in comparing factors derived from test items, these investigators accepted the considerably lower value of .787 as an indication of ". . . a moderate degree of congruence." Following Struening and Cohen's rationale, Thomson (1963) set a minimum level of .60 for factorial congruence in comparing factors derived from life-history items. McCormick, Cunningham, and Gordon (1967) later adopted Thomson's criterion in their comparisons of factors derived from the application of the Worker Activity Profile (WAP) to two samples of jobs.

Because of similarities between the present study and McCormick et al.'s investigation, their criterion of a .60 Tucker coefficient was specified for the comparisons of OAI factors. (The two studies were similar in terms of types of job-rating items, item reliabilities, and the stimuli that were rated.) The additional stipulation that similar factors must have three or more loadings of .15 or greater in common (a requirement proposed by Tucker and applied by both Thomson and McCormick et al.) was also applied in the OAI comparisons. As shown in Table 2, 58 (or 72 percent) of the 81 coefficients of congruence met or exceeded the .60 criterion. The Interpersonal Activities section of the OAI yielded the highest percentage of acceptable coefficients (86 percent), while the Physical Activities section produced the lowest percentage (41 percent). The low level of factorial comparability in the Physical Activities section might be attributed to the specificity of this group of items, which could cause the factor structure to be relatively sensitive to differences between job samples.

In general, the distribution of congruence coefficients obtained in this study leaves something to be desired, although this distribution is comparable to that obtained by McCormick, Cunningham, and Gordon (1967) in a study applying the Worker Activity Profile to two samples of written job descriptions. Even though 72 percent of the coefficients represented in Table 2 met or exceeded the criterion value of .60, this value is not an indication of a high relationship between two factors. Moreover, it must be noted that the procedure of selecting the highest congruence coefficient in each column of the matrices in Appendix E, rather than computing coefficients on the basis of a priori factor matching, increases the likelihood of obtaining coefficients that are inflated by chance. On the other hand, the coefficients of congruence were based on comparisons among factors derived from two samples of approximately 400 jobs each. It seems likely that the factors derived from the combined sample of over 800 jobs would be more stable than the factors emerging from the smaller samples, because of the increased variation of ratings on the OAI items in the larger sample. In conclusion, an examination of Table 2 indicates some degree of stability in the factorial structures derived from the two job samples; that is, the relationships between the two sets of factors almost certainly exceed chance expectations. Analyses to be performed subsequent to this study will determine the inter-rater reliabilities of scores on the factors obtained from the combined sample.

Tables 11 and 12 summarize the 90 first-order and 22 higher-order factors obtained from the combined job sample. These factors are, for the most part, meaningful. All but two of the factors were named, though in some additional instances the interpretations were not entirely clear. In a number of cases, the names of these dimensions correspond to the titles of a priori categories in the OAI. Furthermore, the names assigned to a number of the factors in this study correspond to names of factors derived in an earlier study using the attribute-requirement profiles of the OAI items (Neeb, Cunningham, and Pass, 1971). It should be noted, however, that no systematic comparisons were made between the factors obtained in these two studies.

A distinction should be made between the factors obtained in this study, in which jobs were rated on the OAI work elements (items), and factors derived earlier from attribute-requirement ratings of the OAI elements (Neeb et al., 1971). The factors from the present study are defined by work elements (activities and conditions) that tend to coexist in jobs, while the factors derived by Neeb et al. are defined by work elements that are relatively homogeneous in terms of their estimated human attribute requirements. The relative advantages of these two kinds of work dimensions can only be surmised at this point. As noted by Jeanneret and McCormick (1969):

> . . . there is little substantive evidence available that can be brought to bear on the question as to which [kind] of dimension is the more useful. In fact, the answer to this question is highly dependent upon the particular purpose for which the dimensions might be used, and should be the subject of further empirical investigation [p. 98].

Table 11. Summary of the 90 First-Order Factors Obtained from the Seven Sectional Factor Analyses

Factor Code	Title of Factor
	Information Received
A-1	Electrical/electronic information
A-2	Indirect business/sales information
A-3	Environmental information
A-4	Written technical information
A-5	Mechanical information
A-6	Direct health information
A-7	Information concerning the chemical properties of materials
A-8	Information concerning the physical characteristics of materials
A-9	Information pertaining to human behavior and characteristics
A-10	Clerical information
A-11	Spatial/structural information
A-12	Numerical/graphic information
A-13	Direct sales information
A-14	Art/decorative information
A-15	Information pertaining to food preparation and service
A-16	Topographical information
A-17	Information pertaining to physical arrangement and layout
	Mental Activities
B-1	Semantic planning and problem solving
B-2	Figural perception and problem solving
B-3	Symbolic thinking and problem solving
B-4	Behavioral information processing
B-5	Figural creativity
B-6	Routine semantic/symbolic activities
B-7	Work-related preparation and experience

Table 11 (continued)

Factor Code	Title of Factor
	Mental Activities (continued)
B-8	Semantic facility and productivity
B-9	Spatial information processing
	Physical Work Behavior
C-1	General physical versus sedentary activities
C-2	Machine control operations
C-3	Electrical and mechanical repair and maintenance
C-4	Combining/separating processed substances and materials
C-5	Physical coordination
C-6	Stationary material-removing machine operation
C-7	Activities involving physical contact with people or animals
C-8	Sewing, stitching, and related activities
C-9	Precision work involving small or fragile objects and materials
C-10	Preparation/modification of surfaces
C-11	Precision assembling
C-12	Cutting/processing food materials
C-13	Material forming
C-14	Construction and woodworking activities
C-15	Agricultural activities
C-16	Measuring/testing
C-17	Liquid application/coating
C-18	Heavy equipment operation
C-19	Pressing rubber, plastic, and related synthetic materials
C-20	Activities related to heat and chemical treatment

Table 11 (continued)

Factor Code	Title of Factor
	Representational Work Behavior
D-1	Verbal communication
D-2	Numerical/clerical activities
D-3	Technical drawing
D-4	Use of office equipment
D-5	Technical/symbolic information processing and communication
D-6	Unnamed
D-7	Unnamed
	Interpersonal Work Behavior
E-1	Supervisory activities
E-2	Customer service activities
E-3	Consultation activities
E-4	Subordinate activities
E-5	Teaching/instructing
E-6	Selling
E-7	White-collar personal service activities
E-8	Assisting superiors
	Work Goals
F-1	Bookkeeping objectives
F-2	Electrical/electronic objectives
F-3	Graphic/semantic technical objectives
F-4	Mechanical objectives
F-5	Objectives related to the behavior of others
F-6	Spatial arrangement objectives
F-7	Health objectives
F-8	Material/substance treatment objectives

Table 11 (continued)

Factor Code	Title of Factor
	Work Goals (continued)
F-9	Objectives pertaining to water conditions
F-10	Business/sales objectives
F-11	Clerical objectives
F-12	Material modification objectives
F-13	Organizational objectives
F-14	Objectives pertaining to electrical/electronic plans, innovations, and written communications
F-15	Objectives pertaining to terrain and earth features
F-16	Assembly and fabrication objectives
	Work Context
G-1	Responsibility
G-2	Mechanical hazards
G-3	Steady versus irregular work
G-4	Job structure
G-5	Low or fluctuating temperature conditions
G-6	Uniformed shift work
G-7	Unpleasant or trying interpersonal situations
G-8	Wet or humid working conditions
G-9	Unpleasant/hazardous outdoor working conditions
G-10	High temperature conditions
G-11	Working alone versus working in the presence of others
G-12	Hazardous blue-collar versus white-collar work
G-13	Cooperative versus individual work situations

Table 12. Summary of 22 Higher-Order Work Dimensions

Dimension Code	Title of Dimension
H-1	Business/organizational activities
H-2	Electrical/electronic activities
H-3	Mechanized equipment operation
H-4	Art/decorative activities
H-5	Medical/health related activities
H-6	Sales/customer service activities
H-7	Chemically treating materials/substances
H-8	Verbal versus routine numerical activities
H-9	Clerical activities
H-10	Constructing/fabricating
H-11	Material joining/assembling
H-12	Mechanical activities
H-13	Technical planning and communication
H-14	Instructing and advising
H-15	Activities involving body coordination/orientation
H-16	Figural arrangement and problem solving versus assisting superiors
H-17	Technical drawing and innovation
H-18	Environmentally related activities
H-19	Physical activities associated with unpleasant temperature conditions
H-20	Use of topographical information
H-21	Cutting/separating versus joining/assembling
H-22	Material forming and modification

It seems reasonable to speculate, however, that OAI dimensions derived from job ratings would prove more useful in describing and classifying occupations in terms of concrete activities and conditions, while the dimensions derived from attribute ratings might be appropriately used in estimating the human attribute requirements of occupations and occupational groups.

Subsequent reports in the Ergometric Research and Development Series will describe attempts to validate the OAI work dimensions and attribute-requirement estimates (Bates and Cunningham, in press; Tuttle and Cunningham, in press). These studies will examine the relationships between the quantitative OAI descriptions of occupations (i.e., the OAI work-dimension and attribute-requirement scores of occupations) and cognitive, psychomotor, and affective test scores of persons employed or trained in the occupations.

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APPENDICES

Appendix A

List of Jobs Contained in the Replication Sample

APPENDIX A

	DOT Code	Title of Occupation
401	205.368	Personnel Clerk
402	003.181	Electronic Technician
403	205.388	Licensing Clerk
404	001.281	Draftsman, Mechanical
405	206.388	Classification Clerk
406	008.081	Chemical Engineer
407	011.281	Metallurgical Technologist
*408	011.181	Metallurgical Technician
409	207.782	Multilith Operator
410	012.168	Systems Analyst, Business-Electronic-Data Processing
411	249.268	Survey Worker
412	019.281	Engineering Aid II
413	020.088	Mathematician
414	020.188	Programmer, Business
415	020.188	Programmer, Engineering and Scientific
416	040.188	Forester
417	041.081	Biologist
418	045.088	Psychologist
419	054.088	Sociologist
420	070.108	General Practitioner
421	072.108	Dentist
422	073.108	Veterinarian
423	077.168	Dietitian
424	078.368	Dental Hygienist
425	078.368	Radiologic Technologist
426	078.381	Medical Laboratory Assistant
427	078.381	Medical Technologist
428	079.128	Occupational Therapist
429	079.368	Occupational Therapy Aid
430	079.368	Psychiatric Technician

	DOT Code	Title of Occupation
431	079.368	Inhalation Therapist
432	079.368	Medical Assistant
433	079.378	Nurse, Licensed Practical
434	079.378	Surgical Technician
435	079.378	Dental Assistant
436	091.228	Teacher, Secondary School
437	100.168	Head Catalog Librarian
438	142.081	Clothes Designer
439	159.228	Camp Counselor
440	163.118	Manager, City Circulation
441	166.088	Job Analyst
442	168.268	Credit Man
443	169.188	Underwriter (insurance)
444	169.268	Unemployment Insurance Claims Administrator
445	185.168	Proprietor-Manager, Retail Automotive Service
446	185.168	Manager, Retail Food Store
447	338.381	Embalmer
448	187.168	Manager, Cafeteria or Lunchroom
449	187.168	Manager, Theater
450	193.168	Air-Traffic Control Specialist, Tower
451	195.108	Case Worker
452	202.388	Stenographer
453	205.368	Employment Clerk
454	206.388	File Clerk II (warehouse)
455	207.782	Offset-Duplicating Machine Operator
456	208.588	Typesetter-Perforator Operator
457	209.588	Encoder (banking)
458	209.688	Checker II
459	209.688	Proofreader I
460	210.388	Audit Clerk
461	210.388	Bookkeeper I
462	212.368	Teller
463	213.382	Digital-Computer Operator

	DOT Code	Title of Occupation
464	213.582	Key Punch Operator
465	213.782	Tabulating-Machine Operator
466	217.388	Proof-Machine Operator (banking)
467	219.388	General Office Clerk
468	219.388	Ward Clerk (medical service)
469	219.878	Fountain Girl
470	220.168	Material Coordinator
471	209.388	Proofreader
472	224.487	Weighing-Station Operator
473	209.588	Telephone Order Dispatcher
474	234.782	Mailing-Machine Operator
475	235.782	Telephone Operator
476	235.862	Telephone Answering Service Operator
477	241.168	Claims Adjuster
478	242.368	Hotel Clerk
479	250.358	Salesman, Real Estate
480	276.358	Salesman, Construction Machinery
481	289.358	Salesperson, Automotive Parts
482	289.458	Salesperson, General
483	290.478	Sales Clerk
484	292.358	Bakery-Wagon Driver
485	292.358	Routeman, Retail Dairy Products
486	292.358	Routeman, Wholesale Ice Cream Products
487	299.458	Grocery Checker
488	317.878	Countergirl
489	311.878	Waitress
490	311.878	Waitress II (medical service)
491	317.884	Food Service Worker II
492	330.371	Barber
493	332.271	Cosmetologist
494	355.878	Cottage Parent
495	355.878	Psychiatric Aid
496	359.878	Teacher, Nursery School

	DOT Code	Title of Occupation
497	361.687	Classifier (laundry)
498	363.884	Presser, Hand
499	363.886	Flatwork Finisher (laundry)
500	372.868	Corrections Officer
501	373.884	Fire Fighter
502	375.268	Patrolman
503	379.168	Fish and Game Warden
504	381.887	Building Custodian
505	389.884	Exterminator
506	404.887	Harvest Hand, Citrus Fruit
507	467.384	Artificial-Breeding Technician
508	509.886	Laborer, General (iron and steel)
509	209.688	Checker I
510	514.885	Die-Casting-Machine Operator
511	518.381	Floor and Bench Molder (foundry)
512	518.883	Sand-Slinger Operator (foundry)
513	210.368	Insurance Clerk (medical service)
514	521.887	Peanut Sorter
515	210.388	Billing-Control Clerk (light, heat, and power)
516	524.381	Laborer, Bakery
*517	210.388	Bookkeeper I
518	526.781	Baker
519	211.468	Cashier I
520	529.687	Egg Candler
521	211.468	Cashier-Wrapper
522	212.138	Head Teller
523	529.886	Cannery Worker
524	213.382	Card-Tape Machine Operator "A"
525	214.488	Billing Machine Operator
526	216.588	Food Tabulator, Cafeteria
527	217.388	Transit Clerk (banking)
528	219.138	Time Keeper, Chief (foundry)
529	219.388	Mail Desk Clerk

	DOT Code	Title of Occupation
530	542.280	Stillman (petroleum refinery)
531	553.782	Autoclave Operator
532	556.885	Compression-Molding Machine Tender
533	556.885	Injection-Molding Machine Operator
534	556.885	Record-Press Tender
535	559.782	Pilot-Control Operator (chemistry; plastic material)
536	219.388	Airport Clerk
537	219.488	Invoice-Control Clerk
538	573.687	Sorter (brick and tile)
539	575.380	Forming-Machine Upkeep Man (glass manufacturing)
540	590.884	Processor, Solid Propellant
541	600.280	Machinist I
542	609.885	Production-Machine Operator
543	221.168	Production Clerk, Paperboard Products
544	613.782	Manipulator (rolling mills)
545	614.782	Wire Drawer
546	615.782	Punch-Press Operator
547	616.380	Welder, Pipe-Making
548	619.380	Metal Fabricator I
549	619.381	Inspector, Continuous-Weld-Pipe Mill
550	222.387	Receiving Clerk
551	223.138	Supervisor, Stock (clerical)
552	620.381	Automobile Service Station Mechanic
553	621.281	Aircraft and Engine Mechanic
554	624.281	Farm Equipment Mechanic I
555	625.281	Diesel Mechanic
556	230.878	Messenger
557	231.388	Parcel Post Clerk
558	637.281	Gas Appliance Serviceman
559	638.281	Maintenance Mechanic II
560	641.885	Box Machine Operator
561	649.687	Paper Sorter and Counter
562	235.138	Telephone Operator, Chief

	DOT Code	Title of Occupation
563	649.885	Bag Machine Operator
564	237.368	Receptionist
565	650.582	Linotype Operator
566	650.582	Monotype Keyboard Operator
567	651.782	Offset Web Press Man
568	651.782	Web Press Man (printing and publishing)
569	651.782	Printer-Slotter Operator (paper goods)
570	660.280	Cabinet Maker
571	669.782	Woodworking Machine Operator
572	675.380	Precision Lens Grinder
*573	242.368	Hotel Clerk
*574	681.885	Carding Machine Operator (textile)
575	680.885	Card Tender (asbestos product; textile)
576	681.885	Yarn Winder
577	381.887	Porter I
578	682.885	Spinner, Ring Frame (textile)
579	683.280	Loom Fixer
580	683.782	Weaver
581	683.886	Battery Loader (textile)
582	684.684	Stocking Inspector
583	684.687	Pairer (hosiery)
584	684.782	Transfer Knitter
585	684.885	Sock Knitter
586	685.885	Knitting Machine Operator
*587	689.280	Knitting Machine Fixer
588	689.684	Burler (carpet and rug; textile)
589	689.782	Looper (hosiery; knit goods)
*590	689.782	Hosiery Looper
591	252.258	Salesman, Financial Service
592	689.886	Doffer (knit goods)
593	690.782	Fancy Stitcher
594	690.782	Stitcher, Standard Machine
595	691.782	Extruding Machine Operator

	DOT Code	Title of Occupation
596	691.782	Pairing Machine Operator
597	692.380	Firesetter (electrical equipment)
598	692.885	Sealing Machine Operator
599	699.782	Die Cutter
600	700.884	Ring Stamper
601	705.884	Grinder-Chipper I (foundry)
602	706.884	Coil Winder II
603	252.358	Salesman, Trading Stamps
604	706.884	Power Lawn Mower Assembler
605	253.358	Salesman, Radio and Television Time
606	710.281	Instrument Repairman I
607	255.258	Traffic Agent (air transportation)
608	710.884	Gas-Pump-Computer Assembler
609	257.358	Salesman, Public Utilities (light, heat, and power)
610	715.381	Hairspring Vibrator (clock and watch)
611	715.687	Casing Inspector (clock and watch)
612	715.884	Oiler (clock and watch)
613	715.887	Staker (clock and watch)
614	258.358	Salesman, Advertising
615	720.281	Television Service and Repairman
616	259.358	Salesman, Soft-Water Service
617	721.884	Electric Motor Assembler
618	262.358	Salesman, Food Products
619	264.358	Salesman, Leather Products (wholesale trade)
620	265.358	Salesman, Paper and Paper Products (wholesale trade)
621	274.358	Salesman, Floor Coverings (retail trade; wholesale trade)
622	278.258	Home Service Representative (light, heat, and power)
623	286.358	Salesperson, Sporting Goods (retail trade; wholesale trade)
624	724.887	Coil Finisher (electrical equipment; electronics)
625	725.884	Grid Operator (electronics)
626	126.130	Foreman, Electrical Assemblies
627	726.384	Inspector, Subassemblies (electronics)

	DOT Code	Title of Occupation
628	291.858	Vendor (amusement and recreation)
629	726.781	Electronics Assembler
630	292.358	Salesman, Driver
631	726.884	Cable Maker (electrical equipment; electronics)
632	309.878	Homemaker (domestic service)
633	310.137	Wine Steward (hotel and restaurant)
634	726.887	Module Assembler (electronics)
635	726.887	Mounter I (electronics)
636	727.887	Battery Assembler
637	310.868	Hostess, Restaurant or Coffee Shop
638	731.887	Finisher, Hand (toys and games)
639	732.884	Fishing Rod Assembler
640	311.138	Waiter, Head
641	312.878	Bartender
642	737.887	Fireworks Assembler
643	312.887	Bar Boy
644	313.131	Chef
645	739.884	Case Coverer (jewelry cases; leather products)
646	739.884	Assembler, Metal Furniture
647	739.884	Venetian Blind Assembler
648	740.884	Decorator, Hand
649	313.781	Baker (hotel and restaurant)
650	314.381	Short Order Cook (hotel and restaurant)
651	316.781	Butcher, Head (hotel and restaurant)
652	317.884	Pantrygirl (hotel and restaurant)
653	318.138	Kitchen Steward (hotel and restaurant)
654	772.281	Glass Blower, Laboratory Apparatus
655	318.887	Silver Wrapper (hotel and restaurant)
656	319.468	Order Clerk, Food and Beverages (hotel and restaurant)
657	779.884	Fettler
658	780.381	Furniture Upholsterer
659	782.884	Seamstress
660	784.884	Hat Trimmer

	DOT Code	Title of Occupation
661	785.381	Seamstress, Women's Garment Alterations
662	787.782	Seamer
663	787.782	Glove Sewer
664	319.864	Automat-Car Attendant (railroad transportation)
665	788.887	Cementer, Hand
666	789.887	Garment Folder
667	794.887	Folder, Hand
668	323.887	Houseman (hotel and restaurant)
669	805.281	Boilermaker I
670	806.381	Shipfitter
671	806.781	Outboard Motor Assembler
672	323.887	Maid
673	324.138	Bell Captain (hotel and restaurant)
674	807.381	Automobile Body Repairman
675	329.138	Superintendent, Service (hotel and restaurant)
676	809.381	Ornamental Iron Worker
677	331.878	Manicurist (hosiery)
678	810.884	Welder, Arc
679	810.884	Welder, Gas Shielded Arc
680	812.884	Welder, Combination
681	339.878	Reducing Machine Operator (personal service)
682	344.138	Usher, Head (amusement and recreation)
683	821.381	Lineman, Repair
684	352.168	Director, Recreation (hotel and restaurant)
685	824.281	Electrician
686	801.381	Aircraft Mechanic
687	827.281	Electrical Appliance Serviceman
688	828.281	Electronics Mechanic
689	352.878	Airplane Stewardess
690	353.368	Guide, Establishment
691	356.138	Animal Keeper, Head (amusement and recreation)
692	842.781	Plasterer
693	356.874	Stableman

	DOT Code	Title of Occupation
694	860.381	Carpenter (construction)
695	861.381	Bricklayer
696	358.878	Baggageman (motor transportation)
697	862.381	Pipe Fitter, Maintenance
698	864.781	Carpenter, Floor Rolling
699	362.782	Dry Cleaner (clean, dry, and press)
700	379.868	Lifeguard
701	899.381	Maintenance Man, Building
702	401.181	Farmer, Cash Grain
703	904.883	Tractor-Trailer Truck Driver
704	912.368	Cargo Agent (air transportation)
705	915.867	Automobile Service Station Attendant
706	919.168	Dispatcher, Motor Vehicle
707	919.368	Ticket Agent
708	920.280	Packaging Machine Mechanic
709	920.687	Wrapper (laundry)
*710	920.885	Wrapping Machine Operator
*711	920.885	Container Maker-Filler-Packer Operator
712	403.181	Vegetable Grower
713	404.181	Berry Grower
714	406.181	Rose Grower
*715	920.887	Candy Packer
716	407.884	Groundskeeper
717	920.887	Celophane Wrapper, Hand
718	411.181	Dairy Farmer
719	920.887	Apple Packer
720	920.887	Garment Packer
721	411.884	Farm Hand, Dairy I
722	920.887	Sausage Packer
723	413.181	Cattle Rancher
724	413.884	Farm Hand, Livestock
725	419.884	Animal Caretaker
726	421.887	Hay Stacker

	DOT Code	Title of Occupation
727	922.883	Gasoline Truck Operator
728	922.887	Order Filler
729	429.131	Farm Foreman
730	930.884	Rotary-Driller Helper
731	952.782	Power Plant Operator
732	952.782	Substation Operator
733	421.131	Farmer, General
734	---	Omitted
735	954.782	Water Treatment Plant Operator
736	---	Omitted
737	---	Omitted
738	971.381	Stripper (printing and publishing)
739	---	Omitted
740	972.381	Transferer I (printing and publishing)
741	972.382	Photolithographer
742	973.381	Job Compositor
743	975.782	Stereotyper
744	976.782	Multiple Photographic Printer Operator
745	976.885	Mounter, Automatic
746	---	Omitted
747	222.587	Shipping Clerk II
*748	405.181	Tobacco Grower
749	040.081	Wood Technologist
750	071.108	Osteopath
751	070.108	Psychiatrist
752	045.108	Rehabilitation Counselor
753	120.108	Clergyman
754	144.081	Artist (painter)
755	152.048	Musician (instrumental)
756	130.088	Author (literary writer)
757	187.118	Executive Vice President of Chamber of Commerce
758	187.118	Recreation Supervisor
759	195.118	Social Welfare Administrator (YMCA)

	DOT Code	Title of Occupation
760	---	Omitted
761	100.168	Librarian
762	223.367	Stock Clerk
763	320.137	Motel Manager
764	092.228	Teacher, Elementary School
*765	729.884	Electrical Control Assembler
766	029.381	Chemical Laboratory Technician
767	002.081	Thermodynamics Engineer
768	002.187	Cost Analysis Engineer
769	012.168	Director, Quality Control
770	012.288	Time Study Analyst I
771	041.081	Biochemist
772	099.288	Athletic Coach
773	142.081	Furniture Designer
774	132.068	Columnist
775	143.062	Photographer, Newspaper
776	149.028	Art Teacher
777	160.168	Manager, Premium and Commission Accounting (insurance)
778	160.288	Estimator
779	162.158	Logging Manager
780	162.168	Buyer, Grain
781	163.168	Manager, Utility Sales and Service (light, heat, and power)
782	164.118	Manager, Advertising
783	166.268	Placement Officer
784	168.168	Manager, Credit
785	169.137	Manager, Office
786	183.168	General Foreman
787	184.118	Manager, Area Development
788	184.118	Superintendent, Airport
789	186.168	Operations Officer (banking)
790	186.168	Securities Trader (banking)
791	186.288	Loan Officer (banking)

	DOT Code	Title of Occupation
792	187.118	Superintendent, Home For Aged
793	196.163	Airplane Captain
794	197.133	Captain, Fishing Vessel
795	160.138	Senior Accounting Clerk
796	201.368	Medical Secretary
797	203.588	Teletype Operator
798	203.588	Wires Transfer Clerk (banking)
799	204.268	Policyholder's Information Clerk (insurance)
*800	860.281	Maintenance Carpenter
801	186.168	Branch Bank Manager
802	186.138	Assistant Branch Bank Manager
803	201.368	Secretary
804	203.588	Typist
805	206.388	File Clerk
806	250.258	Insurance Salesman
807	001.081	Building Designer
808	168.168	Credit and Collection Manager
809	023.081	Physicist
810	110.118	Corporation Lawyer
811	189.118	Corporation President
812	164.138	Production Manager, Advertising
813	162.158	Purchasing Agent
814	166.118	Personnel Manager
815	152.028	Music Teacher
816	973.381	Job Printer
*817	012.288	Industrial Engineering Technician
818	---	Omitted
819	---	Omitted
*820	637.281	Refrigeration Mechanic
821	219.488	Accounting Clerk
822	180.118	General Manager, Farm

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*These jobs are not contained in the replication sample. However, they are contained in the combined sample.

Appendix B

OAI Items Excluded from the Factor Analyses

The OAI items which were not included in the six factor analyses are listed below under their appropriate sections.

Information Received

The following items were omitted: 35i, 36i, 41i, 42i, 54i, 58i, 60i, 64i through 68i, 71i, 72i, 75i through 78i, 88i, 90i, 103i, 105i, 108i, 110i, 114i, 116i through 125i.

Mental Activities

The following items were omitted: 1m, 14m, 27m.

Physical Work Behavior

The following items were omitted: 17t, 18t, 19t, 22t through 25t, 27t, 28t, 31t, 32t, 34t through 40t, 44t, 46t, 48t, 51t, 52t, 53t, 66t, 68t, 69t, 72t, 73t, 74t, 76t, 89t, 94t, 95t, 6a, 12a, 21a, 22a, 23a, 41a, 48a, 52a, 54a, 55a, 3j, 4j, 8j, 15j, 18j, 21j, 24j, 29j, 33j, 35j through 41j.

Representational Work Behavior

The following items were omitted: 4r, 5r, 11r, 12r, 13r, 21r, 24r.

Interpersonal Work Behavior

The following items were omitted: 4p, 17p, 18p, 19p, 22p, 24p, 26p, 33p, 34p.

Work Goals

The following items were omitted: 30g, 32g, 40g through 45g, 47g, 48g, 49g, 51g, 52g, 53g, 55g, 56g, 58g through 62g, 64g, 65g, 67g, 68g, 69g, 71g, 86g, 98g, 106g, 109g, 110g, 111g, 112g.

Work Context

The following items were omitted: 5c, 7c, 23c, 28c, 35c, 38c, 39c, 40c, 42c, 44c, 55c, 56c, 60c through 77c.

Appendix C

Factors Obtained from Replication Sample

Table 13. Dimensions of Information Received: Replication Sample

	Work Dimension	Rotated Loading[a]
Dimension A´-1		
16i	Malfunctions of electrical/electronic parts	.90
15i	Interrelations or interconnections of electrical/electronic parts	.86
13i	Overall performance of electrical/electronic devices	.85
14i	State of preventive maintenance	.81
18i	Electrical/electronic schematics and diagrams	.78
21i	Electrical/electronic test equipment and measuring devices	.78
19i	Electrical/electronic symbols and codes	.77
22i	Written material pertaining to electrical/electronic devices	.76
20i	Displays conveying electrical/electronic information	.75
17i	Regulation and control of electrical/electronic systems	.69
45i	Conductivity	.69
23i	Written material pertaining to basic principles of electricity	.65
Dimension A´-2		
86i	Frequency of numerical information	.80
84i	Complexity of numbers	.73
85i	Signs and symbols representing numerical operations and relations	.65
92i	Numerical or coded information	.58
87i	Tables and graphs	.55
97i	Numerical business information	.42
93i	Money or other medium of exchange	.34
79i	Content or meaning	.33

Table 13 (continued)

	Work Dimension	Rotated Loading[a]
Dimension A´-3		
50i	Plant life	.92
51i	Soil	.90
52i	Terrain and geological features	.82
56i	Environmental emergencies	.82
53i	Water conditions	.76
55i	Weather and atmospheric conditions	.74
59i	Tables and graphs	.40
57i	Charts or maps	.36
Dimension A´-4		
25i	Connection and fastening of objects and parts	.80
24i	Interrelation, position, and fit of connected parts or objects	.77
26i	Appearance of assembled or constructed objects in relation to prescribed standards	.75
28i	Drawings, plans, or diagrams pertaining to the arrangement, placement, and fastening of interconnected parts	.60
30i	Measuring and layout devices	.58
31i	Written material pertaining to interrelated parts and objects	.46
29i	Drawings, patterns, or diagrams pertaining to the layout or placement of unconnected parts or objects	.35
Dimension A´-5		
10i	Mechanical test equipment and measuring devices	-.37
8i	Mechanical drawings	-.37
11i	Written material pertaining to mechanical devices	-.48

Table 13 (continued)

	Work Dimension	Rotated Loading[a]
Dimension A′-5 (continued)		
9i	Displays	-.50
5i	Control or regulation of mechanical devices	-.79
6i	Interrelations of mechanical parts	-.80
7i	Mechanical motion	-.82
4i	Malfunction of specific parts or components	-.85
2i	Quantity and quality of machine output	-.85
3i	State of preventive maintenance	-.87
1i	Overall state of mechanical functioning	-.91
Dimension A′-6		
70i	State of health or hygiene	.94
69i	Dietary needs or deficiencies	.91
73i	Materials and devices related to biology or health	.75
74i	Materials, objects, and devices related to nutrition, sanitation, or food preparation	.54
101i	Physical condition of people	.54
Dimension A′-7		
47i	Symbol systems pertaining to materials or substances	.74
49i	Technical written material concerning physical or chemical properties of materials or substances	.66
48i	Nontechnical written material pertaining to materials or substances	.56
46i	Materials measuring or testing devices	.52
44i	Chemical reactivity	.38
31i	Written material pertaining to interrelated parts and objects	.36

Table 13 (continued)

Work Dimension		Rotated Loading[a]
Dimension A´-8		
94i	Merchandise	.72
96i	Customers and clients	.68
95i	Advertising materials	.60
93i	Money or other medium of exchange	.50
91i	Verbal information	.39
113i	Characteristics of groups of people and people in general	.37
74i	Materials, objects, and devices related to nutrition, sanitation, or food preparation	.33
Dimension A´-9		
38i	Fragility or strength	.70
39i	Consistency	.70
34i	Surface characteristics	.65
37i	Physical state	.63
33i	Overall quality	.62
40i	Malleability/ductility	.61
Dimension A´-10		
81i	Format, punctuation, or spelling	.95
80i	Correspondence of contents of one manuscript or list with contents of another	.85
82i	Grammar or expression	.83
83i	Proper classification	.71
79i	Content or meaning	.41

Table 13 (continued)

	Work Dimension	Rotated Loading[a]
Dimension A´-11		
10i	Mechanical test equipment and measuring devices	-.31
11i	Written material pertaining to mechanical devices	-.50
23i	Written material pertaining to basic principles of electricity/electronics	-.52
8i	Mechanical drawings	-.59
32i	Written material pertaining to basic principles of structures	-.69
12i	Written material pertaining to mechanical or physical principles	-.74
Dimension A´-12		
87i	Tables and graphs	-.33
95i	Advertising materials	-.42
97i	Numerical business information	-.56
100i	Contracts and other legal written information	-.68
98i	Business graphs, charts, or diagrams	-.70
99i	Written business information	-.77
Dimension A´-13		
27i	Interrelation or arrangement of unconnected objects within a prescribed space or area	-.34
63i	Location of objects or people in space for aesthetic purposes	-.72
62i	Form or shape of objects	-.80
61i	Colors and color schemes	-.86

Table 13 (continued)

	Work Dimension	Rotated Loading[a]
Dimension A′-14		
43i	Hazard: whether the material is a potential cause of bodily harm	.73
44i	Chemical reactivity: how material behaves chemically	.54
Dimension A′-15		
57i	Charts or maps	.68
59i	Tables and graphs	.59
89i	Diagrams, drawings, or maps	.56
Dimension A′-16		
101i	Physical condition of people	-.35
109i	Emergency situations involving people	-.36
102i	Grooming, style, and poise of people	-.38
104i	Physical performance of people	-.56
115i	Tables, diagrams, graphs, etc., conveying information about people	-.69
113i	Characteristics of groups of people and people in general	-.71
112i	Descriptions of individuals	-.71
111i	Group settings	-.71
107i	Mood, attitudes, feelings, intentions, desires, etc.	-.73
106i	Knowledge, verbal performance, and experience	-.78

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Table 13 (continued)

Work Dimension		Rotated Loading[a]
Dimension A'-17		
27i	Interrelation or arrangement of unconnected objects within a prescribed space or area	.46
29i	Drawings, patterns, or diagrams pertaining to the layout or placement of unconnected parts or objects	.35
92i	Numerical or coded information (oral/auditory)	.35

[a] Rotated loadings less than .30 were omitted.

Table 14. Dimensions of Mental Activities: Replication Sample

	Work Dimension	Rotated Loading[a]
Dimension B´-1		
37m	Person perception	.82
32m	Idea expression	.81
38m	Group perception	.78
18m	Word fluency	.71
35m	Associational fluency	.69
33m	Idea flexibility	.67
22m	Verbal comprehension	.66
36m	Verbal construction	.66
25m	Memory of unitary ideas	.61
30m	Idea originality	.61
31m	Idea production	.61
34m	Plan elaboration	.56
23m	Problem comprehension	.50
24m	Problem detection	.50
26m	Memory of idea sequence	.49
28m	Deductive reasoning	.46
39m	Educational level	.45
29m	Plan ordering	.41
Dimension B´-2		
5m	Visual tracing	.79
3m	Spatial orientation	.77
2m	Object discovery	.76
4m	Object visualization	.72
24m	Problem detection	.45
23m	Problem comprehension	.41
7m	Figural problem solving	.38
6m	Figural memory	.35

Table 14 (continued)

	Work Dimension	Rotated Loading[a]
Dimension B´-3		
16m	Symbolic deduction	.95
19m	Symbolic generation	.90
17m	Symbolic operations sequencing	.87
12m	Comprehension of symbolic procedures	.80
13m	Symbolic induction	.80
21m	Evaluation of symbolic procedures	.77
15m	Numerical computation	.49
28m	Deductive reasoning	.44
33m	Idea flexibility	.33
Dimension B´-4		
11m	Spelling	.82
20m	Clerical perception	.82
36m	Verbal construction	.37
Dimension B´-5		
10m	Aesthetic judgment	.76
8m	Figural ingenuity	.51
30m	Idea originality	.42
Dimension B´-6		
22m	Verbal comprehension	-.30
29m	Plan ordering	-.34
25m	Memory of unitary ideas	-.35
26m	Memory of idea sequences	-.51
7m	Figural problem solving	-.59

Table 14 (continued)

	Work Dimension	Rotated Loading[a]
Dimension B´-6 (continued)		
6m	Figural memory	-.64
9m	Form perception	-.71
Dimension B´-7		
40m	Job-related preparation	.73
41m	Work experience	.71
15m	Numerical computation	.41
29m	Plan ordering	.37
39m	Educational level	.34
34m	Plan elaboration	.31

[a] Rotated loadings less than .30 were omitted.

Table 15. Dimensions of Physical Work Behavior: Replication Sample

	Work Dimension	Rotated Loading[a]
Dimension C″-1		
10a	General body coordination	.68
9a	Balance	.66
11a	Walking	.57
14a	Standing	.46
43t	Supporting (portable non-powered)	.45
8a	Multilimb coordination	.44
13a	Climbing	.44
16a	Kneeling/stooping/crawling	.43
7a	Reaction time	.41
20j	Pre-fabricated construction components of metal and concrete	.38
5a	Manual dexterity	.37
15a	Sitting	-.30
Dimension C″-2		
80t	Foot-operated (continuous settings)	.74
82t	Foot-operated (discrete controls)	.74
83t	Hand-operated (continuous controls)	.68
84t	Foot-operated (continuous controls)	.67
78t	Foot-operated (discrete settings)	.63
81t	Hand-operated (discrete controls)	.61
7a	Reaction time	.59
8a	Multilimb coordination	.56
*	Ear-hand or ear-foot coordination	.55
3a	Tracking	.52
2a	Control precision	.47
26a	Driving/operating (machine related)	.47
79t	Hand-operated (continuous settings)	.44

Table 15 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C´-2 (continued)		
15a	Sitting	.40
71t	Off-road vehicles	.39
1a	Eye-hand coordination	.38
70t	Medium/light highway vehicles	.36
77t	Hand-operated (discrete settings)	.36
10a	General body coordination	.35
5j	Non-processed geological materials	.31
Dimension C´-3		
45a	Earth working	.80
1j	Plant life	.80
16t	Earth working (non-powered)	.77
67t	Heavy equipment (mechanized equipment)	.44
70t	Medium/light highway vehicles	.41
26a	Driving/operating (machine related)	.39
56t	Liquid application/coating (stationary machines and equipment)	.38
30t	Liquid application/coating (portable powered)	.36
Dimension C´-4		
62t	Heat application (stationary machines and equipment)	.76
64t	Combining/separating (stationary machines and equipment)	.74
42a	Heat or pressure treating, except in forming	.71
19j	Processed foods, which require further preparation	.65
39a	Combining/separating (material modifying)	.64

Table 15 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C´-4 (continued)		
85t	Weight/volume (measurement)	.53
88t	Pressure/temperature (measurement)	.40
14j	Chemical and petroleum materials and substances	.30
Dimension C´-5		
30a	Diagnosing/troubleshooting	.78
27a	Repairing	.75
28a	Servicing	.74
29a	Adjusting/tuning	.73
87t	Electrical (electrical devices)	.65
31j	Machines and mechanical components, excluding transportation and mechanized equipment	.58
32j	Electrical/electronic equipment and components	.58
50a	Testing	.55
32a	Installing/connecting	.48
49a	Inspecting	.41
90t	Motion/force (measurement)	.39
88t	Pressure/temperature (measurement)	.31
47a	Monitoring	.30
30j	Transportation and mechanized equipment	.30
Dimension C´-6		
47t	Cutting by sawing (stationary machines and equipment)	.70
60t	Grinding (stationary machines and equipment)	.69
59t	Shaping (stationary machines and equipment)	.67
58t	Drilling/perforating (stationary machines and equipment)	.64

Table 15 (continued)

Work Dimension		Rotated Loading[a]
Dimension C´-6 (continued)		
33t	Perforating/boring (portable powered)	.55
36a	Material shaping	.55
1t	Cutting by sawing (non-powered)	.52
21t	Cutting by sawing (portable powered)	.49
9j	Metal, excluding precious metals	.46
92t	Work layout	.43
33a	Constructing/building	.42
20j	Pre-fabricated construction components of metal and concrete	.41
26t	Fusion (portable powered)	.40
86t	Physical extent (measurement)	.36
41t	Degree of precision in portable powered tool/equipment usage	.35
10j	Lumber and related materials	.33
57t	Abrading (stationary machines and equipment)	.32
Dimension C´-7		
23j	Electrical and electronic parts and components	.64
34a	Assembling	.62
22j	Mechanical parts	.45
13t	Perforating/boring (non-powered)	.44
29t	Mechanical fastening (portable powered)	.43
6t	Mechanical fastening (non-powered)	.40
4a	Finger dexterity	.38
32j	Electrical/electronic equipment and components	.37
26t	Fusion (portable powered)	.35
30t	Liquid application/coating (portable powered)	.34
87t	Electrical (measurement)	.32

Table 15 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C´-7 (continued)		
32a	Installing/connecting	.31
25j	Miscellaneous metal parts, excluding mechanical and electrical parts and construction components	.31
41t	Degree of precision in portable powered tool/ equipment usage	.30
20j	Pre-fabricated construction components of metal and concrete	.30
Dimension C´-8		
16j	Textile and leather materials, including synthetics	.76
35a	Fiber/thread working	.73
54t	Stitching, knitting, and weaving (stationary machines and equipment)	.70
27j	Textile, leather, and related synthetic parts	.70
7t	Stitching/wiring (non-powered)	.46
2t	Cutting by shearing (non-powered)	.41
63t	Pressing (stationary machines and equipment)	.32
43j	Apparel and finished textile and leather products	.30
Dimension C´-9		
5t	Bonding/sealing (non-powered)	.64
13j	Surface preparation and bonding substances	.62
10j	Lumber and related materials	.59
31a	Laying/covering	.51
12t	Shaping (non-powered)	.48
33a	Constructing/building	.35
21t	Cutting by sawing (portable powered)	.33

Table 15 (continued)

Work Dimension		Rotated Loading[a]
Dimension C´-9 (continued)		
11j	Earth materials	.31
13t	Perforating/boring (non-powered)	.30
Dimension C´-10		
9t	Abrading/polishing (non-powered)	.64
8t	Liquid application/coating (non-powered)	.58
38a	Surface finishing	.54
4t	Cutting by abrasion (non-powered)	.49
57t	Abrading (stationary machines and equipment)	.49
30t	Liquid application/coating (portable powered)	.45
25j	Miscellaneous metal parts, excluding mechanical and electrical parts and construction components	.44
22j	Mechanical parts	.39
10t	Scraping (non-powered)	.34
29t	Mechanical fastening (portable powered)	.30
43a	Cleaning	.30
Dimension C´-11		
17a	Lying	.63
26j	Miscellaneous wooden parts, excluding construction components	.36
43t	Supporting (portable non-powered)	.33
42t	Holding (portable non-powered)	.31
6t	Mechanical fastening (non-powered)	.30
44a	Material and object handling	-.31
49a	Inspecting	-.39

Table 15 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C´-12		
53a	Physical treatment, excluding surgery	-.30
14j	Chemical and petroleum materials and substances	-.30
6j	Non-processed woods	-.33
50a	Testing	-.38
91t	Physical characteristics (measurement)	-.50
46a	Precision working	-.51
40a	Chemically treating	-.61
93t	Optical devices	-.66
Dimension C´-13		
9t	Abrading/polishing (non-powered)	-.30
43a	Cleaning	-.34
41t	Degree of precision in portable powered tool/ equipment usage	-.35
20t	Degree of precision in hand tool usage	-.40
2t	Cutting by shearing (non-powered)	-.41
15t	Cleaning (non-powered)	-.48
10t	Scraping (non-powered)	-.52
3t	Cutting by blade (non-powered)	-.58
Dimension C´-14		
11t	Forming (non-powered)	.70
61t	Forming (stationary machines and equipment)	.70
37a	Material forming	.70
11j	Earth materials	.52
12j	Rubber, plastic, and related synthetic materials	.39
14t	Handling (non-powered)	.33

Table 15 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C´-14 (continued)		
12t	Shaping (non-powered)	.32
9j	Metal, excluding precious metals	.31
Dimension C´-15		
50t	Cutting by blade (stationary machines and equipment)	.58
56t	Liquid application/coating (stationary machines and equipment)	.57
49t	Cutting by shearing (stationary machines and equipment)	.54
17j	Paper and paper materials	.48
47a	Monitoring	.42
61t	Forming (stationary machines and equipment)	.33
47t	Cutting by sawing (stationary machines and equipment)	.31
24a	Tending	.31
77t	Hand-operated (discrete settings)	.30
Dimension C´-16		
53a	Physical treatment, excluding surgery	.66
51a	Handling	.63
2j	Animals and marine life	.50
20t	Degree of precision in hand tool usage	.31
7t	Stitching/wiring (non-powered)	.30

Table 15 (continued)

	Work Dimension	Rotated Loading[a]
Dimension C´-17		
5a	Manual dexterity	-.30
75t	Material conveyors (mechanized equipment)	-.33
15a	Sitting	-.34
16a	Kneeling/stooping/crawling	-.35
44a	Material and object handling	-.37
14t	Handling (non-powered)	-.39
18a	Finger/hand/arm strength	-.41
65t	Handling/supporting (stationary machines and equipment)	-.50
19a	General body strength	-.52
20a	Explosive strength	-.53

[a] Rotated loadings less than .30 were omitted.

*This item has since been deleted from the OAI.

Table 16. Dimensions of Representational Work Behavior: Replication Sample

	Work Dimension	Rotated Loading[a]
Dimension D′-1		
17r	Speaking: Level of skill or difficulty	.93
16r	Speaking	.92
28r	Communication ratio	.85
30r	Personalness of subject matter	.84
29r	Communication precision	.83
18r	Ordinary conversational English	.80
31r	Formality or structure of communicative interaction	.80
15r	Writing: Level of difficulty	.69
14r	Writing	.58
7r	Voice transmission and storage devices	.51
38r	Analyzing: Level of difficulty	.50
39r	Synthesizing: Level of difficulty	.44
36r	Calculating/computing: Level of difficulty	.42
27r	Complexity of numerical information communicated	.40
1r	Writing devices	.35
19r	Formal, grammatically correct English	.34
37r	Compiling	.34
26r	Communicates with numbers	.31
Dimension D′-2		
33r	Copying/recording	.85
32r	Comparing/checking	.82
34r	Classifying/categorizing	.82
3r	Keyboard devices	.70
10r	Mechanical computing devices	.65
35r	Calculating/computing	.59
26r	Communicates with numbers	.55

Table 16 (continued)

	Work Dimension	Rotated Loading[a]
Dimension D´-2 (continued)		
1r	Writing devices	.49
14r	Writing	.41
37r	Compiling	.40
6r	Office reproducing devices	.38
7r	Voice transmission and storage devices	.38
27r	Complexity of numerical information communicated	.38
Dimension D´-3		
2r	Drawing devices	.90
25r	Communicates by drawing	.88
1r	Writing devices	.34
9r	Hand computing devices	.31
36r	Calculating/computing: Level of difficulty	.30
Dimension D´-4		
6r	Office reproducing devices	.63
8r	Audio-visual transmission and storage devices	.51
19r	Formal, grammatically correct English	.46
3r	Keyboard devices	.39
26r	Communicates with numbers	-.31
35r	Calculating/computing	-.32
36r	Calculating/computing: Level of difficulty	-.33
27r	Complexity of numerical information communicated	-.36

Table 16 (continued)

	Work Dimension	Rotated Loading[a]
Dimension D´-5		
19r	Formal, grammatically correct English	-.31
38r	Analyzing: Level of difficulty	-.37
39r	Synthesizing: Level of difficulty	-.42
9r	Hand computing devices	-.57
20r	Technical terms	-.65
23r	Communicates with special written codes	-.75
Dimension D´-6		
22r	Signals by visual means	.81
38r	Analyzing: Level of difficulty	-.35
19r	Formal, grammatically correct English	-.37
39r	Synthesizing: Level of difficulty	-.46

[a] Rotated loadings less than .30 were omitted.

Table 17. Dimensions of Interpersonal Work Behavior: Replication Sample

	Work Dimension	Rotated Loading[a]
Dimension E´-1		
9p	Organizing	.93
8p	Personnel actions	.92
10p	Disciplining	.92
27p	Interacts with subordinates	.92
7p	Evaluating	.87
5p	Close supervision	.82
6p	General supervision	.77
Dimension E´-2		
21p	Pacifying/placating	.75
20p	Debating/discussing	.74
23p	Diverting/entertaining	.68
16p	Advising/counseling	.41
12p	Obtaining information from others	.37
11p	Giving information to others	.34
14p	Persuading	.31
Dimension E´-3		
32p	Interacts with students	.92
15p	Teaching/instructing	.84
16p	Advising/counseling	.30
Dimension E´-4		
25p	Interacts with superiors	.80
1p	Assisting	.64
3p	Directions received: Degree of specificity	.62

Table 17 (continued)

Work Dimension		Rotated Loading[a]
Dimension E´-5		
2p	Serving/catering	.83
31p	Interacts with the general public	.70
30p	Interacts with customers	.66
11p	Giving information to others	.57
Dimension E´-6		
1p	Assisting	-.37
12p	Obtaining information from others	-.48
16p	Advising/counseling	-.48
29p	Interacts with consultants or advisors	-.61
28p	Interacts with clients or patients	-.77
Dimension E´-7		
13p	Demonstrating	.82
14p	Persuading	.78
30p	Interacts with customers	.47

[a] Rotated loadings less than .30 were omitted.

Table 18. Dimensions of Work Goals: Replication Sample

	Work Dimension	Rotated Loading[a]
Dimension F´-1		
13g	Causes of electrical/electronic malfunction located or identified	.92
15g	Electrical/electronic functioning restored	.92
14g	Electrical/electronic functioning maintained	.88
18g	Satisfactory output from electrical/electronic devices	.86
12g	Substandard conditions of electrical/electronic devices detected	.84
17g	Electrical/electronic devices regulated, adjusted, or controlled	.83
19g	Electrical/electronic schematics and/or diagrams	.72
16g	Electrical/electronic devices installed or assembled	.70
21g	Written communication of electrical/electronic information	.41
20g	Electrical/electronic innovations or plans	.31
Dimension F´-2		
10g	Mechanical plans or innovations	.90
11g	Written communication of mechanical information	.86
9g	Mechanical drawings	.79
39g	Drawings or diagrams of constructed, assembled, modified, fabricated, or arranged objects/materials	.71
84g	Completed diagrams, charts, and maps	.66
80g	Solutions to advanced mathematical problems	.54
36g	Innovations or plans in assembly, fabrication, or material modification	.50
38g	Written communications pertaining to material/object modification, assembly, or fabrication	.43
73g	Non-standard or innovative written output	.38

Table 18 (continued)

	Work Dimension	Rotated Loading[a]
Dimension F´-2 (continued)		
20g	Electrical/electronic innovations or plans	.33
35g	Innovations or plans in construction, installation, or spatial arrangement of objects	.32
Dimension F´-3		
76g	Written material categorized	-.32
88g	Semantic/symbolic material verified	-.37
89g	Completed sales or business/organizational transactions	-.45
72g	Routine written output	-.52
83g	Numerical information orally communicated	-.63
94g	Balanced, verified, or updated business/organizational records	-.64
82g	Numerical data displayed	-.71
81g	Recorded or transcribed numerical data	-.75
79g	Solutions to standard arithmetic problems	-.79
Dimension F´-4		
104g	Others' compliance with directions, rules, or laws insured or monitored	-.34
107g	Enjoyment, satisfaction, or mood change of others	-.38
103g	Attitude, opinion, or belief change in others	-.59
101g	Physical competence of others improved or assessed	-.72
108g	Innovations or plans pertaining to people	-.73
102g	Others' knowledge improved or assessed	-.74
105g	Improved adjustment or adaptation of others	-.82

Table 18 (continued)

	Work Dimension	Rotated Loading[a]
Dimension F´-5		
2g	Causes of mechanical malfunction located or identified	.91
3g	Mechanical functioning maintained	.89
4g	Proper mechanical functioning restored	.88
1g	Substandard conditions of mechanical devices detected	.84
6g	Satisfactory output from mechanical devices	.76
7g	Properly regulated or controlled mechanical devices	.73
5g	Mechanical devices installed or assembled	.64
Dimension F´-6		
33g	Spatially arranged objects	.70
34g	Properly located or placed objects	.67
57g	Aesthetically arranged objects or things	.53
90g	Merchandise shelved, packaged, stored, demonstrated, or otherwise handled	.39
28g	Materials/substances modified by miscellaneous mechanical actions	.32
37g	Written communications pertaining to construction, installation, or spatial arrangement	.30
Dimension F´-7		
100g	Improved state of grooming or appearance of people	-.56
66g	Medically related service tasks completed	-.62
70g	Written biological/health communication completed	-.78
63g	Causes or potential causes of health problems identified	-.78

Table 18 (continued)

Work Dimension		Rotated Loading[a]
Dimension F´-8		
50g	Maintenance of satisfactory water conditions and/or detection of unsatisfactory water conditions	.87
54g	Written communications pertaining to water, atmospheric, or astronomical conditions or events	.86
21g	Written communication of electrical/electronic information	.44
80g	Solutions to advanced mathematical problems	.36
Dimension F´-9		
22g	Completed structures and other constructed objects	.74
25g	Shaped objects	.63
27g	Finished or prepared surfaces	.56
37g	Written communications pertaining to construction, installation, or spatial arrangement	.55
24g	Installed or attached objects	.45
35g	Innovations or plans in construction, installation, or spatial arrangement of objects	.41
36g	Innovations or plans in assembly, fabrication, or material modification	.36
39g	Drawings or diagrams of constructed, assembled, modified, fabricated, or arranged objects/materials	.32
26g	Formed objects	.30
Dimension F´-10		
78g	Verbal material transcribed	.72
75g	Written material edited or checked for composition and format	.62
76g	Written material categorized	.58

Table 18 (continued)

	Work Dimension	Rotated Loading[a]
Dimension F´-10 (continued)		
87g	Reproduced semantic/symbolic material	.58
88g	Semantic/symbolic material verified	.56
85g	Information encoded into written symbols or codes	.44
74g	Written material reviewed or edited for content	.42
Dimension F´-11		
93g	Public relations accomplishments	.53
103g	Attitude, opinion, or belief change in others	.49
91g	Advertising material produced, displayed, or disseminated	.48
89g	Completed sales or business/organizational transactions	.44
107g	Enjoyment, satisfaction, or mood change of others	.44
57g	Aesthetically arranged objects or things	.31
Dimension F´-12		
97g	Organizational plans or innovations	.86
95g	Satisfactory index or organizational performance attained	.78
99g	Written business/organizational communication	.77
92g	Employee relations accomplishments	.72
96g	Business/organizational data gathered, compiled, or displayed	.72
93g	Public relations accomplishments	.49
91g	Advertising material produced, displayed, or disseminated	.46
104g	Others' compliance with directions, rules, or laws insured or monitored	.45

Table 18 (continued)

Work Dimension		Rotated Loading[a]
Dimension F´-12 (continued)		
77g	Oral information communicated	.30
94g	Balanced, verified, or updated business/organizational records	.30
Dimension F´-13		
29g	Treated materials or substances	.75
28g	Materials/substances modified by miscellaneous mechanical actions, excluding material removal and forming	.64
26g	Formed objects	.30
Dimension F´-14		
31g	Satisfactory condition of assembled or fabricated objects, excluding mechanical and electrical/electronic devices	.82
23g	Assembled or fabricated objects	.70
Dimension F´-15		
46g	Terrain or earth features modified	.72
84g	Completed diagrams, charts, and maps	.39
104g	Others' compliance with directions, rules, or laws insured or monitored	.38

[a] Rotated loadings less than .30 were omitted.

Table 19. Dimensions of Work Context: Replication Sample

	Work Dimension	Rotated Loading[a]
Dimension G´-1		
47c	Financial or material consequences of errors	.75
50c	Organizational responsibility	.74
46c	Updating knowledges, techniques, and skills	.69
49c	Intangible consequences of errors	.68
31c	Task diversity	.49
25c	Business attire	.32
41c	Distractions or interruptions	.32
48c	Safety consequences of errors	.30
Dimension G´-2		
13c	Mechanical hazards	.77
22c	Work clothes	.63
8c	Noise intensity	.62
4c	Dirty environment	.61
20c	Overall hazard of the job	.59
21c	Safety apparel	.52
48c	Safety consequences of errors	.44
18c	Toxic conditions	.36
6c	Vibration	.34
14c	Moving or falling objects	.32
16c	Exposure to burns	.32
25c	Business attire	-.33
Dimension G´-3		
32c	Steady work	.88
33c	Seasonal work	-.64
37c	Variable hours	-.74
34c	Irregular work	-.83

Table 19 (continued)

	Work Dimension	Rotated Loading^a
Dimension G´-4		
26c	Work procedures	.84
29c	Performance standards	.84
27c	Timing and sequence	.82
30c	Goals	.77
43c	Confinement to a specified work space	.59
52c	Working individually in the presence of co-workers or others where social interaction is possible	.35
31c	Task diversity	-.40
Dimension G´-5		
12c	Sudden temperature changes	.81
11c	Low temperature	.79
10c	High temperature	.51
3c	Humid	.34
2c	Wet	.32
Dimension G´-6		
58c	Unpleasant social relationships	.80
57c	Interpersonal conflict	.78
41c	Distractions or interruptions	.45
59c	Civic obligations	.45
54c	Working individually in a one-to-one relationship with a customer, client, student, etc., where social interaction is restricted primarily to that person	.30

Table 19 (continued)

	Work Dimension	Rotated Loading[a]
Dimension G´-7		
24c	Uniform	.77
19c	Other hazards	.54
48c	Safety consequences of errors	.48
25c	Business attire	-.46
Dimension G´-8		
51c	Working alone with little or no opportunity for social interaction	.84
52c	Working individually in the presence of co-workers or others where social interaction is possible	-.44
Dimension G´-9		
17c	Electrical hazards	.75
15c	High places	.59
16c	Exposure to burns	.36
18c	Toxic conditions	.35
14c	Moving or falling objects	.30
3c	Humid	-.31
Dimension G´-10		
9c	Unpleasant weather conditions	.62
1c	Indicate the amount of time the worker spends inside and outside	.52
6c	Vibration	.48
2c	Wet	.36
4c	Dirty environment	.35
14c	Moving or falling objects	.31

Table 19 (continued)

	Work Dimension	Rotated Loading[a]
Dimension G´-10 (continued)		
10c	High temperature	-.54
16c	Exposure to burns	-.55
Dimension G´-11		
53c	Working jointly with others as part of a team where social interaction and co-operation are necessary	.63
45c	Time away from home	.48
54c	Working individually in a one-to-one relationship with a customer, client, student, etc., where social interaction is restricted primarily to that person	-.32
52c	Working individually in the presence of co-workers or others where social interaction is possible	-.38
Dimension G´-12		
36c	Changing shift work	.79
41c	Distractions or interruptions	.41

[a] Rotated loadings less than .30 were omitted.

Appendix D

Factor Correlation Matrices for the Seven Sectional Analyses with the Replication Sample

Table 20. Factor Correlation Matrix for the Information Received Section of the OAI: Replication Sample

	Factor																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Factor																	
1	1.00	.10	.01	.20	-.26	-.03	.18	-.07	.10	-.06	-.24	.04	.05	.09	.10	.03	-.02
2		1.00	.04	-.01	-.04	.04	.13	.11	.00	.21	-.15	-.23	.04	.14	.10	-.11	.00
3			1.00	-.02	-.06	.06	.02	.06	.01	-.04	.05	.01	.01	.03	.20	-.03	.06
4				1.00	-.16	-.06	.19	-.08	.20	-.16	-.23	.02	-.16	-.04	.08	.08	.03
5					1.00	.05	-.07	.08	-.25	.15	.18	-.14	.02	-.16	-.06	-.14	.06
6						1.00	.08	-.01	-.05	-.07	.02	.05	-.03	.11	.00	-.24	.10
7							1.00	-.01	.24	-.04	-.22	-.03	-.12	.10	.08	.00	-.02
8								1.00	-.04	.11	.02	-.15	-.10	-.01	-.07	-.06	.11
9									1.00	-.15	-.09	.09	-.11	.14	.00	.09	-.06
10										1.00	.02	-.24	.05	-.02	.02	-.18	.03
11											1.00	.05	.02	.00	-.14	.04	-.01
12												1.00	-.02	.04	-.01	.19	-.01
13													1.00	.03	-.04	.05	-.12
14														1.00	.08	-.06	-.01
15															1.00	-.12	.04
16																1.00	-.10
17																	1.00

Table 21. Factor Correlation Matrix for the Mental Activities Section of the OAI: Replication Sample

			Factor				
	1	2	3	4	5	6	7
Factor							
1	1.00	.11	.40	.20	.08	- .11	.29
2		1.00	.16	- .09	.08	- .29	.08
3			1.00	.16	- .01	- .14	.26
4				1.00	- .07	- .05	.12
5					1.00	- .02	.06
6						1.00	- .23
7							1.00

Table 22. Factor Correlation Matrix for the Physical Work Behavior Section of the OAI: Replication Sample

	Factor																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Factor																	
1	1.00	.14	.06	.04	.17	.11	.08	.05	.07	.11	.03	-.04	-.11	.11	.02	.02	-.11
2		1.00	.08	.00	.17	.01	.04	.03	.02	.07	.04	-.06	-.01	.06	.09	.03	-.08
3			1.00	.04	.03	.06	-.08	-.05	.03	.01	.07	.01	-.01	-.01	-.04	.12	-.15
4				1.00	.10	.01	-.00	.04	.03	.07	-.06	-.08	-.10	.10	.05	.13	-.07
5					1.00	.11	.15	.01	-.01	.10	.03	-.11	-.01	.09	.06	.07	-.04
6						1.00	.16	.04	.12	.11	.10	-.06	-.07	.14	.04	-.02	-.11
7							1.00	.04	.08	.12	.04	-.10	-.05	.08	.00	.02	-.05
8								1.00	.01	.07	-.01	-.02	-.06	.06	.02	-.03	-.01
9									1.00	.08	.05	-.04	-.05	.05	-.01	.02	-.02
10										1.00	.01	-.05	-.07	.12	.05	.03	-.07
11											1.00	-.05	.00	.00	-.03	-.03	-.04
12												1.00	.01	-.05	-.04	-.03	-.02
13													1.00	-.08	.03	-.04	.09
14														1.00	.06	.02	-.01
15															1.00	-.02	-.03
16																1.00	-.04
17																	1.00

Table 23. Factor Correlation Matrix for the Representational Work Behavior Section of the OAI: Replication Sample

	Factor					
	1	2	3	4	5	6
Factor						
1	1.00	.28	.27	.02	- .26	- .15
2		1.00	.14	.06	- .22	- .07
3			1.00	.01	- .25	- .05
4				1.00	.04	- .02
5					1.00	.15
6						1.00

Table 24 Factor Correlation Matrix for the Interpersonal Work Behavior Section of the OAI: Replication Sample

	Factor						
	1	2	3	4	5	6	7
Factor							
1	1.00	.17	.16	- .15	.14	- .24	.19
2		1.00	.09	- .03	.20	- .23	.26
3			1.00	- .08	- .03	- .21	.09
4				1.00	.02	- .02	- .06
5					1.00	- .11	.15
6						1.00	- .17
7							1.00

Table 25. Factor Correlation Matrix for the Work Goals Section of the OAI: Replication Sample

Factor	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	1.00	.21	.02	.00	.20	.00	.04	.14	.13	-.05	-.08	-.02	-.04	.10	-.10
2		1.00	-.04	-.07	.00	.02	.03	.18	.25	.08	-.06	.08	-.01	-.04	-.13
3			1.00	.07	.09	-.09	-.04	-.09	.10	-.21	-.05	-.21	.04	.12	-.02
4				1.00	.10	-.06	.17	-.06	-.03	-.01	-.08	-.27	.04	.06	.00
5					1.00	-.03	.08	-.03	.04	-.12	-.06	-.12	.04	.11	.11
6						1.00	.04	.02	.04	-.09	.10	.05	.00	.01	.05
7							1.00	.00	.00	.01	.00	.05	-.02	.01	-.02
8								1.00	.00	.00	.01	.09	-.01	-.07	-.02
9									1.00	-.02	-.02	.04	.08	.12	-.06
10										1.00	-.01	.11	-.03	-.15	-.04
11											1.00	.12	.00	-.03	.00
12												1.00	-.07	-.14	-.01
13													1.00	.05	.04
14														1.00	.02
15															1.00

Table 26. Factor Correlation Matrix for the Work Context Section of the OAI: Replication Sample

						Factor						
	1	2	3	4	5	6	7	8	9	10	11	12
Factor												
1	1.00	-.06	-.10	-.24	.00	.28	.08	.09	.01	.01	.06	.08
2		1.00	-.11	.15	.18	-.08	.16	.06	.25	.12	.05	-.14
3			1.00	.13	-.12	-.11	-.16	-.08	.01	-.24	-.11	.06
4				1.00	.03	-.15	.00	-.12	-.03	-.04	-.07	.04
5					1.00	.06	.12	.06	.09	.04	.03	-.08
6						1.00	.06	.04	-.02	.07	.05	.04
7							1.00	.10	.09	.08	.04	.00
8								1.00	.06	.06	.04	-.06
9									1.00	.02	.07	-.10
10										1.00	.08	-.13
11											1.00	-.05
12												1.00

Appendix E

Matrices Containing Coefficients of Congruence

Table 27. Coefficients of Congruence for Information Received

	Analysis B (Replication)																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Analysis A																	
1	.10	.12	-.02	.20	-.04	-.01	.35	-.02	.16	.01	-.83	-.06	.04	.03	.08	-.01	.00
2	-.02	.29	-.01	-.09	.02	.04	-.05	.04	-.05	.89	-.01	-.23	-.03	.09	-.01	-.15	.12
3	.98	.08	.00	.07	-.06	-.01	.10	-.03	.02	-.01	-.16	.01	.00	.05	.08	.00	-.02
4	.01	.04	.93	-.03	-.01	.00	-.00	.00	.00	-.01	-.02	-.03	.03	.06	.43	-.03	.06
5	.09	.08	.01	.04	-.97	-.02	.01	.00	.08	-.06	-.21	.03	.01	.11	.05	.02	-.04
6	-.01	.14	-.03	-.04	.02	.55	-.06	-.05	-.06	-.02	.02	-.01	-.07	.22	.09	-.64	.29
7	.06	.27	.02	-.02	-.04	.04	.71	.07	.28	-.03	-.05	-.04	-.02	.46	.04	-.03	.08
8	.01	-.07	.02	.18	.03	-.02	.11	.18	.06	.06	-.08	.06	-.90	-.05	.04	-.06	.30
9	-.03	.24	.01	-.07	.05	-.05	-.06	.82	.02	.04	.00	-.44	-.12	.02	-.09	-.13	.14
10	-.05	.01	.01	-.06	-.04	-.08	-.08	.01	-.23	-.05	.08	-.03	-.10	-.52	-.13	.11	.07
11	.11	.00	-.01	.91	-.10	.04	.13	-.06	.15	-.10	-.25	-.06	-.08	.00	.08	.03	.15
12	-.01	.11	-.01	-.03	-.01	.05	-.08	-.07	-.01	-.31	.05	.23	.09	.11	-.13	.73	.16
13	.00	.01	.06	-.06	.01	.77	.06	.19	-.01	-.04	.02	.11	-.01	-.05	-.06	-.03	-.11
14	.03	.26	.06	-.14	.08	-.04	.02	.09	-.15	.16	.03	-.73	.02	.01	-.13	-.19	-.01
15	-.01	.10	.04	.17	.00	-.02	.19	-.07	.10	.07	-.20	-.20	-.04	-.02	.27	-.02	.16
16	.11	.81	-.01	.23	-.04	.07	.34	.05	.06	.14	-.26	-.25	-.01	-.08	.35	-.13	-.06
17	-.01	.07	.02	.01	-.06	-.02	.16	-.10	.80	-.11	.09	-.02	-.22	.11	-.02	.01	-.13

Table 28. Coefficients of Congruence for Mental Activities

	Analysis B (Replication)						
	1	2	3	4	5	6	7
Analysis A							
1	.69	.17	.36	-.05	-.19	-.25	.57
2	.00	.57	.12	-.01	.13	-.82	.25
3	.43	.24	.16	.06	.73	-.20	.19
4	.24	.20	.94	.10	.03	-.02	.07
5	.30	-.08	.33	.80	-.12	-.17	.42
6	.00	.49	.02	-.10	.12	.11	.36
7	-.81	.00	-.05	-.29	-.26	-.07	-.02

Table 29. Coefficients of Congruence for Physical Work Behavior

	Analysis B (Replication)																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Analysis A																	
1	.14	.12	-.00	-.03	.87	.11	.33	-.01	-.06	-.04	.06	-.13	-.10	.06	.04	.05	.01
2	.23	.83	.24	-.02	.20	.04	.05	.03	-.07	.13	.07	-.02	.05	-.02	.08	.10	-.14
3	-.69	-.06	-.12	-.15	-.11	-.07	-.02	-.09	-.07	-.14	.02	-.13	.18	-.10	-.04	-.10	.63
4	.17	.12	-.12	.54	.16	-.01	-.04	-.04	.03	.05	.08	-.45	-.04	.11	.09	.22	.09
5	-.18	-.08	.05	.07	-.17	-.67	-.16	-.07	-.04	-.24	-.11	.23	-.08	-.25	-.24	.09	.13
6	-.04	.17	.04	-.07	.04	-.06	.06	.78	.02	-.02	-.11	.02	-.14	.01	.07	.02	.03
7	.10	-.00	-.06	.04	.06	.23	.03	.02	.25	.53	-.07	-.09	-.34	.32	-.11	-.03	-.12
8	-.02	.02	.14	.58	.08	-.09	-.02	.04	-.08	.08	-.11	-.12	.15	.05	.30	-.08	.02
9	.11	-.06	.03	-.02	.08	.09	.12	.17	.50	.15	.12	-.24	-.20	-.10	-.06	.08	.00
10	.02	-.02	.02	-.39	.03	-.18	.09	.03	-.12	.01	.13	-.16	.50	-.08	-.09	-.19	.16
11	.03	.07	-.16	.00	.04	.14	.72	.11	.09	.02	-.08	-.28	-.22	.11	-.06	.06	-.18
12	.21	.09	.59	.01	-.09	.14	-.02	-.13	.08	-.16	.18	-.16	-.14	.01	-.14	.29	.00
13	-.09	-.07	.06	.04	.01	-.33	.07	-.07	-.28	-.02	.13	.03	-.08	-.05	-.19	-.06	-.06
14	.04	-.01	-.07	.05	.03	.11	-.01	.02	-.03	.12	.03	-.11	-.09	.63	.22	-.13	.02
15	.06	.06	.33	.03	.02	-.04	.00	-.06	.28	-.00	.12	.13	.02	.24	-.01	-.12	-.03
16	.06	-.02	.17	.00	.15	.34	.34	.00	.25	.17	.40	.20	-.12	-.06	-.15	-.07	-.16
17	.10	.06	.14	.03	.02	-.08	.12	-.03	.07	.23	.02	-.15	-.37	.04	.17	.34	-.22

Table 30. Coefficients of Congruence for Representational Work Behavior

	Analysis B (Replication) 1	2	3	4	5	6
Analysis A						
1	.96	.11	.06	.07	.12	-.06
2	.20	.06	.92	-.15	-.31	-.22
3	.02	.59	.05	.41	-.34	-.18
4	-.40	-.86	-.24	.21	.16	.12
5	.34	.12	.18	-.02	-.90	-.20
6	.09	.05	.12	.36	.08	-.60

Table 31. Coefficients of Congruence for Interpersonal Work Behavior

	Analysis B (Replication) 1	2	3	4	5	6	7
Analysis A							
1	.97	.15	.15	-.02	.04	-.05	.07
2	.03	.14	.00	-.01	.66	-.23	.72
3	-.17	-.04	.00	.85	-.04	.13	-.09
4	.04	.59	.15	-.05	-.09	-.71	.26
5	.03	.00	.86	.01	-.06	-.01	.33
6	-.03	.35	.19	-.05	.63	-.29	-.20
7	-.12	-.02	-.02	-.47	-.35	.23	.06

Table 32. Coefficients of Congruence for Work Goals

	Analysis B (Replication)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Analysis A															
1	-.03	.01	-.85	.03	-.02	.02	.04	-.06	-.10	.46	-.03	.36	-.01	-.10	.04
2	.96	-.01	-.01	-.03	.13	-.04	.00	.03	.00	-.02	-.02	.00	.00	.08	-.07
3	.09	.93	-.10	-.04	.02	.06	.05	.11	.29	.00	-.04	.09	-.09	-.00	-.14
4	.14	.05	.00	.02	.94	.05	.04	.03	.10	-.02	-.05	.00	-.05	-.12	.08
5	.00	.10	-.04	.02	-.07	.69	-.03	-.02	.13	.02	.28	.21	.12	.07	-.11
6	-.02	.00	-.02	-.35	-.02	.04	-.81	-.05	-.01	.03	.02	-.08	-.05	-.02	.05
7	.01	-.09	.01	.24	.08	.16	-.06	-.14	-.08	-.25	-.11	-.63	.07	.20	.08
8	.00	.00	.00	-.04	-.03	-.04	-.23	.70	.06	.05	-.08	.06	.10	-.10	.06
9	.01	.05	-.04	.04	.13	.02	-.03	.12	-.03	-.13	-.05	.02	.73	-.04	.00
10	.10	.11	-.06	-.05	.00	.04	-.05	.10	.48	-.18	-.14	.06	-.07	.36	.12
11	.03	.01	.28	.32	.09	-.19	-.03	.00	.04	-.06	-.74	-.30	.17	.20	-.05
12	.10	.02	-.15	-.04	-.03	.19	-.02	.13	-.06	-.01	.17	-.07	-.05	-.21	-.06
13	.04	.11	-.27	-.10	-.10	-.16	-.08	.16	.03	.68	.19	.11	.01	-.17	-.29
14	-.06	.01	.01	.02	.16	-.42	-.01	-.04	.39	-.08	.22	-.11	.16	.02	.06
15	.03	.03	-.21	-.66	.00	.07	-.02	.09	.01	.04	.06	.48	.10	.08	.21

Table 33. Coefficients of Congruence for Work Context

	Analysis B (Replication)											
	1	2	3	4	5	6	7	8	9	10	11	12
Analysis A												
1	.92	-.04	-.05	-.22	.00	.32	.02	.09	.05	-.02	.12	.16
2	-.02	.37	-.27	-.08	.08	.19	.13	.11	.31	.66	.24	-.09
3	.00	.00	.88	.03	-.08	.07	-.02	-.01	-.02	-.20	.01	-.00
4	-.18	.15	.04	.91	.07	-.04	.01	-.06	-.03	.03	-.10	.23
5	.01	.29	-.06	-.01	.58	.05	.29	-.05	.31	-.42	-.01	.08
6	-.23	.22	-.01	.17	.03	-.74	-.18	.02	.02	-.07	.17	-.26
7	-.09	.18	-.15	.07	.45	.10	.21	.06	-.13	.17	-.05	-.39
8	-.14	.06	-.02	.03	-.19	-.03	.66	.08	.06	-.05	-.07	.11
9	.07	-.13	-.06	-.15	.14	.01	.26	.54	-.03	.05	.53	.23
10	-.01	-.73	-.05	.00	-.05	.13	-.13	.13	-.14	-.02	-.12	-.17
11	.12	.56	.00	.10	-.04	-.10	.22	.30	.21	.02	-.16	-.27
12	-.02	.10	.02	.01	.18	-.04	.09	.10	.68	.17	.00	-.18

Appendix F

Factor Correlation Matrices for the Seven Sectional Analyses with the Combined Sample

Table 34. Factor Correlation Matrix for the Information Received Section of the OAI: Combined Sample

Factor	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	1.00	.01	.04	.19	.26	-.02	.21	.08	.02	-.01	.22	.17	-.06	-.03	-.01	.09	.10
2		1.00	.04	.07	-.11	-.05	.05	-.08	.23	.33	-.04	.22	.22	.01	.04	-.01	.04
3			1.00	-.01	.04	.07	.07	.01	.05	.01	-.04	.08	.03	-.04	.02	.15	.11
4				1.00	.08	-.06	.14	.06	.04	.02	.23	.17	-.04	.00	.02	.05	.17
5					1.00	-.04	.18	.21	-.10	-.11	.14	.12	-.08	-.02	.00	.05	.06
6						1.00	.11	-.04	.27	.01	-.03	.03	.08	.01	.07	.02	.02
7							1.00	.28	.07	.05	.09	.21	.02	.01	.02	.10	.08
8								1.00	-.06	-.12	.19	.06	-.05	.09	.04	.02	.07
9									1.00	.24	-.03	.12	.14	.10	-.05	.15	.06
10										1.00	-.13	.20	.21	-.01	-.02	.06	.02
11											1.00	.08	-.10	.13	.01	.06	.21
12												1.00	.08	.01	-.05	.07	.17
13													1.00	.13	.02	-.02	.08
14														1.00	.05	-.03	.22
15															1.00	-.05	.04
16																1.00	.02
17																	1.00

Table 35. Factor Correlation Matrix for the Mental Activities Section of the OAI: Combined Sample

	Factor								
	1	2	3	4	5	6	7	8	9
Factor									
1	1.00	.12	.41	.37	.28	.24	.21	.22	.15
2		1.00	.10	.06	.16	.06	.12	- .16	.28
3			1.00	.28	.24	.27	.31	.20	.09
4				1.00	.29	.29	.34	.20	.06
5					1.00	.14	.29	.28	.17
6						1.00	.23	.14	- .05
7							1.00	.12	.03
8								1.00	- .05
9									1.00

Table 36. Factor Correlation Matrix for the Physical Work Behavior Section of the OAI: Combined Sample

	Factor																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Factor																				
1	1.00	.12	.08	.05	.01	.05	.04	.06	-.08	.15	-.08	.08	.06	.13	-.14	.05	.09	-.02	-.06	.01
2		1.00	.11	.07	.15	.05	.06	.09	-.08	.04	-.03	.00	.03	-.01	-.11	.02	.05	.16	-.02	.01
3			1.00	.10	.15	.11	.07	.01	-.11	.08	-.17	-.01	.08	.04	-.04	.15	.03	.10	-.04	.01
4				1.00	.06	.01	.09	-.02	-.01	.05	.01	.06	.13	.00	.02	.11	.01	.01	.00	.17
5					1.00	.05	.04	.07	.00	.06	-.02	-.01	.09	.02	-.01	.08	.06	.03	-.01	.01
6						1.00	-.02	.01	-.04	.09	-.10	-.03	.08	.10	.05	.03	.03	.00	.02	.04
7							1.00	.00	-.01	.09	-.08	.02	.04	.03	-.06	.06	.00	.06	-.03	-.03
8								1.00	.01	.02	-.07	.03	.04	.05	.04	.03	.09	-.02	.06	-.04
9									1.00	-.01	.03	.02	.01	-.05	.09	-.01	.02	-.08	.03	.05
10										1.00	-.13	.03	.16	.13	-.02	.06	.08	.00	-.06	-.01
11											1.00	.04	-.05	-.13	-.05	-.12	-.05	.00	.00	.08
12												1.00	.02	.02	-.07	-.02	.02	-.06	-.02	.03
13													1.00	.09	.02	.06	.07	-.01	-.04	.02
14														1.00	-.06	.06	.06	.02	-.01	-.06
15															1.00	-.04	.02	-.09	.06	.00
16																1.00	.05	.00	.03	.02
17																	1.00	.00	.03	.02
18																		1.00	-.04	-.01
19																			1.00	.02
20																				1.00

Table 37. Factor Correlation Matrix for the Representational Work Behavior Section of the OAI: Combined Sample

Factor	1	2	3	4	5	6	7
1	1.00	.41	.26	.10	- .38	- .16	.25
2		1.00	.20	.30	- .32	- .10	.03
3			1.00	.02	- .33	- .09	.10
4				1.00	- .11	- .11	.13
5					1.00	.12	- .11
6						1.00	- .09
7							1.00

Table 38. Factor Correlation Matrix for the Interpersonal Work Behavior Section of the OAI: Combined Sample

Factor	1	2	3	4	5	6	7	8
1	1.00	.12	.24	- .22	.21	.23	.17	.08
2		1.00	.09	- .08	- .03	.24	.14	.15
3			1.00	- .15	.17	.25	.26	.22
4				1.00	- .14	- .14	- .11	.01
5					1.00	.12	.09	.09
6						1.00	.25	.12
7							1.00	.12
8								1.00

Table 39. Factor Correlation Matrix for the Work Goals Section of the OAI: Combined Sample

	Factor															
Factor	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	1.00	.00	.04	-.06	-.10	.10	.01	-.03	.05	-.11	.25	-.14	.20	.08	.03	-.06
2		1.00	.19	.22	-.06	-.01	.00	-.06	.06	.10	-.02	.04	-.02	.12	.01	.16
3			1.00	.03	-.08	.03	.00	-.01	.15	.02	.11	.07	.13	.16	-.02	.08
4				1.00	.05	-.05	.08	.05	-.04	.10	-.12	.13	-.10	-.03	.10	.04
5					1.00	-.07	.16	.03	-.06	.14	-.07	.02	-.26	-.05	-.04	.00
6						1.00	.02	-.02	.00	-.16	-.03	-.01	.08	-.02	.06	-.01
7							1.00	-.02	-.04	.03	-.02	.00	.04	.00	.01	.01
8								1.00	.01	.03	-.05	.04	-.04	-.02	.02	.03
9									1.00	.01	.06	-.01	.12	.13	.02	-.01
10										1.00	-.08	.06	-.21	-.01	.02	.08
11											1.00	-.09	.19	.04	-.04	-.14
12												1.00	-.03	-.02	-.02	.12
13													1.00	.07	.00	-.10
14														1.00	-.01	-.02
15															1.00	-.01
16																1.00

Table 40. Factor Correlation Matrix for the Work Context Section of the OAI: Combined Sample

Factor	1	2	3	4	5	6	7	8	9	10	11	12	13
1	1.00	- .07	- .07	- .27	- .08	.13	- .33	- .06	.08	.03	.09	- .01	.01
2		1.00	- .11	.15	.07	- .04	.17	.12	.21	.17	.07	.14	.01
3			1.00	.08	- .01	- .07	.08	- .14	- .24	.10	- .13	- .09	- .03
4				1.00	.04	- .02	.23	.04	- .07	.05	- .09	- .03	- .05
5					1.00	.02	.06	.14	.05	.10	- .02	- .03	.01
6						1.00	- .16	.01	.00	.02	.03	.00	.01
7							1.00	.01	- .05	.08	- .05	.06	.04
8								1.00	.11	.04	.10	.06	- .01
9									1.00	.09	.11	.09	.07
10										1.00	- .03	.12	.03
11											1.00	.07	.03
12												1.00	.01
13													1.00

Appendix G

Factor Correlation Matrix for the Higher-Order Analysis

Table 41. Factor Correlation Matrix for the Higher-Order Analysis

	Factor																					
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Factor																						
1	1.00	.01	-.06	-.02	-.03	.16	-.07	-.07	-.18	-.03	-.11	.07	-.16	.28	-.05	.04	-.21	.16	-.07	.01	-.01	-.01
2		1.00	-.04	.01	-.05	-.04	.01	-.06	.06	.08	.04	-.06	-.09	.01	.06	.05	-.12	.06	.04	-.06	-.09	.08
3			1.00	-.01	-.02	.03	.06	-.02	.05	.00	-.07	-.09	.04	-.01	.06	.01	.06	.13	.07	-.04	-.02	-.12
4				1.00	.07	-.09	.02	.00	.00	-.05	-.02	-.01	.03	-.06	-.05	-.03	.07	-.04	.00	.04	-.03	-.06
5					1.00	-.09	-.01	.08	.00	-.02	.49	-.02	.09	-.17	-.02	.01	.03	-.06	.01	.11	.01	-.02
6						1.00	-.06	-.07	-.16	-.04	-.09	.07	-.06	.19	.01	-.00	-.02	.04	.03	-.02	.05	-.05
7							1.00	-.01	.06	-.02	.00	-.09	-.07	-.04	-.02	.00	.01	.05	.06	.00	.06	.09
8								1.00	.12	.04	.01	-.02	.05	-.01	.00	-.05	.06	-.04	.00	.03	.02	.04
9									1.00	.12	.07	-.11	.15	-.16	.01	.05	.06	.02	.11	.05	.01	.04
10										1.00	.06	-.16	.03	-.02	.06	.07	-.10	.03	.06	-.01	-.09	.12
11											1.00	-.04	.05	-.10	.06	.00	.02	-.08	-.08	-.01	-.01	.08
12												1.00	.00	.06	-.14	-.05	.00	-.01	-.01	.05	.06	-.08
13													1.00	-.14	.04	-.02	.18	-.15	.09	.06	.05	-.01
14														1.00	-.02	.02	-.10	.17	-.05	-.12	.02	-.02
15															1.00	-.02	.01	.01	.08	-.06	-.06	.02
16																1.00	-.12	.04	.00	.01	-.02	.05
17																	1.00	-.11	.04	.07	.06	-.04
18																		1.00	.03	-.05	-.02	-.04
19																			1.00	-.01	.01	.01
20																				1.00	.02	.01
21																					1.00	.00
22																						1.00